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Zásady pro vypracování:

Cílem práce je analýza článků populárně naučného stylu především z hlediska gramatických struktur vyskytujících se v jejich textových vzorcích. Diplomandka na základě studia odborné lingvistické literatury shrne podstatné charakteristické rysy populárně naučného žánru a soustředí se hlavně na výskyt jednotlivých gramatických kategorií v souvislosti s účelem jednotlivých částí textu. V následné analytické části se bude snažit odhalit obecně platné principy použití gramatických signálů v textových vzorcích těchto článků. Zaměří se především na zkoumání jednotlivých gramatických kategorií slovesa (např. kategorii času, vidu a rodu, použití negace, vyjádření modality apod.) V závěru se autorka pokusí vztáhnout tato zjištění k výsledkům, ke kterým došla v analýze lexikálních signálů v žánrové struktuře ve své bakalářské práci.

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Souhlasím s prezenčním zpřístupněním své práce v Univerzitní knihovně.

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Annotation: An attempt made in this work is to define the grammatical aspects of the moves in the generic structure of popular scientific reports (PSRs). The basic aspects contained in the theoretical part are move analysis; the process of science popularization, a definition of PSRs and the modified structure of PSRs. In the practical part 35 popularised reports randomly chosen in internet were examined in detail using the modified structure based on the Nwogu's structure (1991). The results obtained from this analysis indicate that PSRs have a schema made up of eight schematic structures called "moves". Each move fulfils a particular purpose and contains the grammatical features typical to it. In this work, a grammatical feature refers to the most frequent grammatical aspect occurring in a concrete move. The occurrence as well as the function of each grammatical feature is always associated with the purpose of a concrete move and sometimes also with the lexical signals of a particular move.

KEYWORDS

move analysis; science popularization; generic structure of PSRs, grammatical features

NÁZEV

Gramatické aspekty ve struktuře populárně vědeckých prací

Souhrn: Hlavním cílem této práce je určit gramatické aspekty v žánrové struktuře populárně naučných zpráv, konkrétně v jejich textových vzorcích. Hlavními body obsažené v teoretické části jsou „move analysis“, proces popularizace naučných zpráv, jejich definice, a modifikovaná struktura populárně naučných zpráv. V praktické části je analyzováno 35 populárně naučných zpráv, náhodně vybraných z internetu, dle modifikované struktury, která vychází ze struktury Nwogu (1991).Výsledky získané z analýzy ukazují, že populárně vědecké zprávy mají schéma, tvořené osmi vzorky textu označené „moves“. Každá tato část plní v textu svůj určitý účel a obsahuje pro ni charakteristické prvky. V této studii jsou za charakteristické prvky považovány gramatické úkazy, které se v dané "move" vyskytují často a vzhledem k ní plní určitý účel. Navíc, výskyt některých gramatických prvků je také ovlivněn lexikálními signály té konkrétní move.

KLÍČOVÁ SLOVA

move analysis; populárně naučné zprávy; struktura populárně naučných zpráv, gramatické aspekty

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1 Introduction

It is evident that at these days science plays a very important and visible role in modern society. It can influence the distribution of political power and also the quality of life through technology. People are interested in recent findings and discoveries, but they need a special way of presenting them, since they are no-specialists in this field. Therefore, there exists an interaction between the scientific world and the world of news media related to the area called 'Science Popularization'.

The main goal of this thesis is to identify grammatical features in the generic structure of popular scientific reports (PSR) by the use of move analysis in hand. The theoretical part progresses from larger units to more concrete ones. The first chapter is dedicated to genre analysis and its background. It discusses the three different approaches to genre analysis which are: the English for Specific Purposes (ESP), the Systemic Functional Linguistics (SFL) and the New Rhetoric (NR); and it also describes a top-down approach to discourse analysis, since move analysis was developed as a top-down approach. The following section introduces move analysis, developed by Swales and describes its general steps. A corpus-based approach is also introduced in this section to show the differences between a corpus-based analysis and move analysis in hand.

The second half of the theoretical part is concerned with the description of Science Popularization. It explains the process of Science Popularization to better understand its main function and introduces Haupt's definition of the genre of popular scientific reports (PSRs) that underlines the fact that popular scientific reports are not identified as a social interaction, but as a transactional genre with the main purpose of transmitting information. In PSRs the transmitted information is determined as the information concerned with the recent scientific finding. Moreover, Martin's idea demonstrating possible relationships among genres is presented here, since it is considered to be interesting and beneficial for the SP genre. Because the audience always affects the way of introducing information, the next section discusses the audience of PSRs. Since this study is based on the Nwogu's structure of Science Popularization - to my knowledge, his work is the only one dealing with the generic structure of popular scientific reports (PSRs) - the following part is concerned with the

description of Nwogu's structure to underline its significance in this concrete area. The last section of the theoretical part is concerned with the modified structure of PSRs used within this study. It provides theoretical descriptions of all smaller units called "moves" organizing the structure of PSRs and introduces the lexical signals of each move. This section also contains the expected grammatical features deduced from the purposes of individual moves and in some cases also from the lexical signals of individual moves.

The beginning of the practical part is dedicated to the description of the corpus and methodology used in this work concerning grammatical features in the generic structure of popular scientific reports. The essential step for analysing grammatical features was an identification of smaller parts of a text called "Moves" which organise the generic structure of popular scientific reports in the overall structure. They were examined in detail regarding their purposes in the structure, since according to the purposes of individual moves, grammatical features were analysed**.** The basic concept contained in the practical part is focused on grammatical features. It provides comments on each grammatical feature focused on its main function within a particular move and its possible association with the concrete lexical signal(s). The last section of the practical part introduces the results obtained from the analysis.

The motivation for this study was influenced by two main reasons. The first of them was my interest in linguistics and the second was my interest in science popularization. The generic structure of popular scientific reports and the analysis of its lexical signals were the basic concepts of my Bachelor thesis. Therefore, there was a motivation to extend the work by analysing grammatical features and to discover whether there exists any close relation between the lexical signals of the SP genre and its grammatical features.

2 Genre analysis

2.1 Background

Genre analysis was developed as a part of discourse analysis specialising in the organisation of discourse. Therefore, it is used especially for descriptive analysis of the textual data. In recent years genre analysis has become multi-faceted, often prompting different views on analysing genre. These variations in approaches have been induced by different motivations for the analysis such as: a specific application of findings, a more socio-critical look at what people do with language, or a theoretical issue or focus. On that account, there exist three different approaches to genre analysis: the English for Specific Purposes (ESP), the Systemic Functional Linguistics (SFL) and the New Rhetoric (NR). This part of the thesis is dedicated to the review of all these three approaches. The NR approach is briefly discussed to show its impropriety for this study. Via SFL approach the lexico-grammatical features of moves are also analysed. For that reason it seems appropriate to introduce SFL approach here to present another possible way of analysing lexico-grammatical features. Particular attention is paid to the ESP approach since ESP approach has been applied to popularised health and medical texts. Furthermore, this study is based on Nwogu analysis of popularized medical text which is based on Swales' model for analysis of genre.

Genre viewed by an NR approach is described as a recurrent social action recognised by the writer and also by the reader. The essential aspect in NR is the meaning. According to this approach the genre acquires meaning from social action (Miller in Suhardja, 2008:38). Genre studies in the new rhetoric are more focused on relations between text and context and less on features of the text. Moreover, these studies tend to use ethnography to discover attitudes, values and beliefs of the text users (Hyland in Shuardja, 2008:38).

On the basis of SFL, genre is described as a “staged goal-oriented social processes” (Halliday & Martin, 1993; Martin & Rose, 2002 cited in Suhardja, 2008:37) It is viewed as a social process because it involves interaction with people, goal-oriented because genre is used to achieve a purpose, and staged because it has to go through concrete stages to achieve that purpose. SFL is focused on the social purpose and the structure, which helps to achieve the purpose.

In an SFL approach the genre is realised via register, organised into "tenor", "field", and "mode" (Martin & Rose in Suhardja,2008:37), tenor concerns the nature of participants, field refers to nature of social action and mode is related to the use of language. Analysis of genre using this approach will incorporate analysis of field, tenor and mode (Suhardja, 2008: 37).

2.1.1 The English for Specific Purposes (ESP)

According to Swales there are three central terms related to the ESP approach: discourse community, genre and schema.

Swales claims that when defining a discourse community, a group of individuals have to share six characteristics: common goals, participatory mechanism, information exchange, community specific genres, a highly specialised terminology and high general level of expertise. All these criteria are discussed below.

The first characteristic is the members´ shared goals. In terms of popular scientific reports the common goal is to inform and to entertain the public. The second characteristic is the presence of a mechanism for communication among members which allows them to achieve their shared goals (Swales in Suhardja, 2008: 35). This mechanism takes several forms, for example meetings, correspondence, conversation and many more. In general, it can be described as "…an active interaction among the members to achieve a common goal." (Mirahayuni, 2002:25) The third typical feature of discourse community is active participation by members. Journalists´ active participation can be seen as the output produced by them, for example the news reports. The next characteristic is the genre(s) that is (are) possessed by the discourse community. The purpose of this criterion is to establish the status of the discourse community in relation to other communities. The fifth characteristic is associated with the members´ acquisition of specialised terminologies. According to Swales specialized terminology is "driven by the requirements for efficient communication exchange between experts." (Swales in Mirahayuni, 2002: 26) For instance, journalist jargons, such as 'headline' 'byline' and 'wires' are considered as specialised terminologies used in the media discourse. The last typical feature of a discourse community is related to the level of members´ expertise. Swales suggests that the continuation of a discourse community depends on a reasonable ratio of novice and expert members.

The second central term is a genre. Genre is defined by Swales “as a class of communicative events with a set of goals that are shared by members of a discourse community.” (Swales in Suhardja, 2008: 36) In other words, genre can be described as a type of social activity in which the language plays an essential role. The two important aspects of the genre are: the use of language in a conventionalised setting and the structure. The use of language in a particular setting reflects the communicative purpose and it must be highlighted that the purpose concretely influences the structure and **linguistic features of genre**. The structure of genre is determined by the communicative purpose or social function of a genre in terms of smaller parts called "moves" by Swales. According to Swales' definition, which I have adopted as a general definition of a genre and introduced above, the structure of text is made up by a series of moves. Every move is characterised by its own specific purpose, which is reflected in the subject matter of each move. For that reason, the generic structure is considered to be one of the major representatives of the purpose of genre. (Stejskalová, 2010:10).

The last central term related to an ESP approach is schema. Schema is a rather psychological concept associated with the organisation of knowledge in the memory and it is influenced by previous experience and prior texts. Genre is identified by two types of schemata: content schema and formal schema. Content schema contains of knowledge of facts and concepts acquired from previous experience and prior text. Knowledge of text structure, rhetoric, style and procedures obtained from prior texts contribute to formal schema. To understand the genre it is necessary to understand both contents (Suhardja, 2008: 36).

The most common example of an ESP approach to genre analysis can be seen in Swales’ moves analysis of research articles. Move analysis was developed as a top-down approach to discourse analysis (Biber, 2007:15), therefore the following part is dedicated to a description of a top-down approach to discourse analysis.

2.1.2 Top-down research approach

In a top-down research approach the discourse units are identified before beginning the corpus analysis and the entire analysis is realized after that in those terms. This analysis requires seven steps:

The first step is to develop an analytical framework, determining the types of discourse units. This process is based on the major communicative functions that discourse units can serve in these texts. That framework is then applied to the analysis of all texts in the corpus. When texts are segmented into discourse units, it is necessary to identify and categorise each type of discourse unit in every text of the corpus. Once these discourse units are identified "linguistic analysis of each unit" can follow. At this stage they are analysed and described for their **lexical/grammatical features** of each discourse unit in each text of the corpus. Finally, the complete texts and then the full corpus are analyzed and described by organizational patterns (Biber, 2007:13).

In terms of move analysis the text is described as sequence of "moves", where each move represents a part of the text fulfilling a particular communicative purpose. The functional analytical framework is developed first, then, on the basis of that analytical framework texts are segmented into "moves" representing discourse units. The final step of move analysis is to analyse moves and functional move types to identify their linguistic features (Ibid., 15).

When comparing procedures of top-down analysis and those of corpus-based move analysis, it is clear that move analysis really illustrates a top-down approach. Move analysis is further described in the following part of this work.

2.2 Move analysis

Discourse approach of move analysis was developed by Swales within the more general field of ESP. The original aim of his work was to teach advanced non-native English speakers (NNSs) to read and write research articles and also to help NNS professionals who want to publish their articles in English. His idea was also based on the fact that moves of genre are considered as an inherent part of the genre and they can be used for teaching writing texts in that genre (Dudley-Evans in Biber, 2007: 32).

In move analysis the organizational patterns of text are described as consisting of a series of moves. Moves are considered to be functional units in a text, together fulfilling the overall purpose of the genre. They differ in length, but usually contain at least one proposition and they also differ in their frequency. Some moves occur more frequently than others in the genre and are described as conventional. On the other hand, the moves occurring less in the genre are described as optional.

As it has already been mentioned, every move is characterised by its own specific purpose which is reflected in a subject matter of each move and its constituent or multiple elements that realize it. These elements are called 'steps' by Swales (Swales cited in Biber, 2007: 29). The main function of the multiple elements is to achieve the purpose of the particular move to which they belong, but for the reasons of space these smaller units will not be considered in this paper.

Since the moves have different functional and semantic purposes, it is reasonable to expect variations in linguistic features that realize the move's purposes. Referring to this work, different **grammatical features** considered as characteristic features for individual moves are expected (expected grammatical features are introduced later). In general, moves can be seen as semantic and functional units of texts that have a concrete communicative purpose; moreover, moves generally contain different linguistic features that can be analyzed. The function of **linguistic features** (lexicogrammatical features) is very significant since they affect how the message is received by the audience. Moreover, some genres can be reliably identified only by their lexicogrammatical features (Listyani in Pospíchal, 2010: 4).

The following part of this work can serve as a useful instruction for doing move analysis.

2.2.1 General steps of a move analysis

A move is considered as a very crucial aspect for move analysis. Therefore, this approach is in line with the theoretical definition of a move: "that each move has its own purpose but also contributes to the overall rhetorical purpose of the text." (Biber, 2007: 32)

When doing move analysis, several steps could be followed. First of all, it is important to understand the overall rhetorical purpose of texts in the genre. This understanding of the overall rhetorical purpose helps to identify categories for a genre. The second procedure is to recognize the function of each text unit and to determine its local purpose. This step is quite difficult, since move categories need to be distinctive. The third step is looking for any common functional-semantic themes, represented by various text units that have been identified.

After dividing a particular text into moves, it is appropriate to start with a pilot coding to test and fine-tune definitions of move purposes. Then, the coding protocol of moves with clear definitions and examples should be developed.

The next step of move analysis is linguistic analysis of individual moves, focused on typical elements of moves and their characteristics. Finally, the last step of move analysis is to identify characteristic move structure for the genre and its **linguistic features.**

All these steps described above are not considered as strict "rules" since there are no rules established for move analysis. They are considered as common procedures that might be followed when doing move analysis. Furthermore, not all of these common procedures have to be followed by researcher(s) (Biber, 2007: 32).

A corpus-based approach is usual for using the analysis of well-designed representative collection of texts of a concrete genre. Texts are encoded electronically; therefore, the research findings are more complex and generalized. It also reveals linguistic patterns and the frequency of a concrete aspect that would be too laborious when doing it by hand (Baker in Biber, 2007: 36).

Qualitative (functional) interpretation of the results is considered as an essential step in any corpus-based analysis. Corpus-based approach is not simply a quantitative approach since it depends on quantitative techniques as well as qualitative ones. Also on the basis of this type of analysis, the moves and move types in each text must first be identified by the researchers and then the communicative purposes of different parts of a text should be qualitatively judged.

A corpus-based approach to move analysis is different from the traditional analysis in the following aspects:

a) analysis is done on a large representative collection of texts from a particular genre;

b) the texts are electronically encoded to allow for computerized counts and calculations using different programs and software packages;

c) once the coding rubric for move types is developed, the texts are analysed to identify the moves and code the move types;

d) linguistic analysis of characteristics of move types is done in order to provide details about how different communicative purposes are realized linguistically;

e) quantitative counts permit the discussion of general trend, relative frequency of particular move types and prototypical and alternate patterns of move type usage (Ibid., 36).

For the purpose of this work, move analysis in hand was preferred. The choice of this technique was influenced by the fact that only 35 PSRs create the corpus and that examining a relatively small representative collection of texts from a particular genre and using move analysis rather than corpus-based approach can provide some significant advantages.

One possible advantage of move analysis in hand is that it can make the analysis more precise since it deals with small details and looks for possible relations among them. This fact also supports the idea that the quality of analysis in hand is supposedly higher than the quality of computer driven corpus-based analysis. Another advantage might be associated with the purpose of a particular genre. On the basis of this perspective, the purpose is more deeply analysed and also better understood, which makes the next steps of the analysis easier to realize. Therefore, it can be said that within this type of analysis the context is very important element.

This part of the work described the move analysis in general, the corpus-based approach to move analysis and the move analysis of the genre of science popularization. However, science popularization as such has not been introduced yet. For that reason, the following theoretical section is focused on the Science Popularization.

3 Science Popularization

These days science plays a very important role in society. Interaction between the scientific world and world of the news media is unavoidable but the interaction between these two aspects is quite complicated. Society and news media are two totally different pillars of modern society and therefore, there exist many difficulties. Moreover, the world of science and that of media differ in a way of developing their own realities (de Semir, 2000: 125).

The existence of Science Popularization is described as a consequence of the expansion of magazines and newspapers. Along with the rise of popular scientific reports (PSRs) it is also connected to the emergence of a new group of professionals, referred to as "the entrepreneurs of science," whose primary function is to popularize science to the public (Stejskalová, 2010: 11). This type of reporter is a professional who translates information from a specialized source into an unspecialized one. The information must be understood by a general audience that has no previous knowledge of this information (de Semir, 2000:125).

When classifying popular scientific reports two relevant aspects should be considered. Firstly, popular scientific reports may be divided according to the type of media channel in which the PSRs are popularized: printed media as magazines and newspapers; and electronic media such as radio and television. The second possible aspect for classification can be the status of writers: science researchers popularizing their works or "entrepreneurs of science" (Nwogu, 1991:112-113).

In the following section the process of SP news is described; hence, it influences the choice of **lexicogrammatical features** used in PSRs.

3.1 The SP process

Science Popularization (SP) can be described as a process of recontextualization of knowledge from scientific contexts (such as laboratories and research institutes) to the mass media (Motta-Roth, 2009, based on Bernstein, 1974 cited in Scherer, 2010: 26). In this process, non-professional versions of scientific knowledge are disseminated in newspapers, magazines and TV shows in order to enable non-specialized readers to incorporate such knowledge into their existing knowledge in order to actively participate in political decisions concerning scientific issues (Scherer, 2010: 26).

The most common view of SP considers two separate discourses: one within scientific institutions, which is scientific discourse and one outside the scientific institutions, which is the popularization discourse. The main function of the popularization discourse is to popularize the science for non-specialist (Myers, 2003:266). On the basis of this viewpoint it is clear that scientific knowledge is translated into simple term for non-professional audience and that the information is "distorted, hyped up and dumb down." (Ibid., 266)

A more contemporary view of the process defines SP news as a part of a cycle of activities that interrelates science and society. This cycle of activities contains three axes through which the SP process is realized. The three axes as follows: 1) the role of the media to inform society about new research outcomes; 2) the responsibility of the author of the SP text to explain principles and concepts to society and 3) the need society has to understand the relevance of the research (Motta-Roth in Scherer, 2010: 28). It must be emphasized that these three axes influence the choice of **lexicogrammatical features** and also the linguistic strategies used in SP news. The genre of PSR is discussed in the next part of this work.

3.2 The Genre of Popular Scientific Report (PSR)

For the purpose of my thesis I have adopted Swales´ general definition of genre. He defined genre as follows:

> A genre comprises a class of communicative events, the members of which share some set of communicative purposes. These purposes are recognized by the expert members of the parent discourse community, and thereby constitute the rationale for the genre. This rationale shapes the schematic structure of the discourse and influences and constrains choice of content and style. (1990:58)

As a definition of popular scientific reports I have used Haupt´s definition, which is based on Swales´ general definition of genre. Haupt defines the genre of science popularization as a " […] genre whose purpose is to inform the general non-professional public about recent discoveries in a brief, (more or less) balanced, positive and (more or less) entertaining manner." (Haupt, 2010:163)

Haupt suggests that popular scientific reports are not identified as a social interaction, but as a transactional genre with the main purpose to transmit information (Haupt, unpublished notes). The essential feature of genre is the type of transmitted

information. In terms of PSRs the transmitted information is determined as the information concerned with the recent scientific findings. Myers claims that the knowledge travels only one way, from science to society (Mayers, 2003:266)

Haupt's definition seems to be adequate; however, it does not say anything about lexicogramatical features. His definition could be completed with the fact that the purpose of the genre of science popularization is fulfilled by functional-semantic units, each having its own **lexicogrammatical features**. The definition would be the following: The genre of SP is the genre whose purpose is to inform the general non-professional public about recent discoveries in a brief, (more or less) balanced, positive and (more or less) entertaining manner. The genre of SP is realized by the use of functional-semantic units called "moves', each having its own characteristic **lexicogrammatical features.**" In this completed definition it would be emphasized that transmitted information has its own structure and also concrete **lexicogramatical features**.

Martin's idea, presented afterwards, is very interesting. Martin demonstrates that genres are in relation to one another rather than in isolation. For this reason, it is suiTable to consider science news in relation to three genres or groups of genres.

Science news constitutes a subgenre of news. It is determined as a subgenre of news due to the specification of the content as discoveries and also due to a positive tone suggesting the plausibility of the discovery being reported. Other elements such as the audience, the relative balance and the entertainment value of the report are more or less the same as for other types of news.

The research article is another type of genre, related to science news. The relationship between these two genres is based on a source text. News reports are based on a source text and the source text of science news is usually a research article. These two genres have certain common aspects of content. However, in other elements they are rather different.

The third genre is the genre of popular scientific articles. It also conveys scientific knowledge but this genre cannot be considered as identical to the genre of popular scientific reports. The format of popular scientific articles and the format of popular scientific news are completely different in three aspects. Firstly, popular scientific articles are not based on recent discoveries; secondly, they do not follow the

typical structure of news; and thirdly, they contain a larger amount of background information (Haupt, 2010:163).

Since the popular scientific reports are examined as a subgenre of news, the factors contributing to their newsworthiness have to be mentioned. Moreover, these factors help to explain the entertainment value mentioned in the Haupt's definition. According to Fahnenstock the newsworthiness of science can be explained "by two major appeals: deontological and teleological. Deontological appeal (also called wonder appeal) is based on associating a phenomenon with a category which has a recognized value in and of itself." (Fahnenstok in Haupt, 2010: 163) This deontological appeal is connected with the marvels of nature or remarkable scientific accomplishments. By contrast, teleological appeal is related to practical application, in other words, that a discovery can lead to further benefits (Haupt, 2010:163).

The way of presenting any type of information is always associated with the target audience. Therefore, the audience of PSRs and the process known as popularization of science are described in the following part.

3.3 Popularization of Science and its Audience

The importance of science popularization has been influenced by the development of democracy and communication, by the increasing consciousness of the importance of science for the distribution of political power and also by a better quality of life through technology (Calsamiglia, 2003:147).

It has already been written that the target audience affects the way how the information of popular scientific reports is introduced to its audience. As the main goal of PSRs is to introduce recent scientific findings and their possible implications to non-specialist readers, the transmitted information of popular scientific reports is presented to a potential non-specialist audience in an interesting and celebratory way, rather than in a validating way. It is due to the fact that popular scientific accommodations are incredibly impressive (Fahnestock, 1986:279). For this reason, language used in popular scientific reports should be easily understandable and not too complicated for a non-specialist audience.

The process of presenting the transmitted information of popular scientific reports can be described as bridging the gap between the scientific world and non-scientific

audiences and concretely this process of bridging the gap is known as a popularisation of science (Calsamiglia, 2003:148).

As previously stated in part 1.1.3 an important aspect of the genre is generic structure. Since this study is based on the Nwogu's structure of Science popularization- to my knowledge, his work is the only one dealing with the generic structure of popular scientific reports (PSRs) – the next section is dedicated to his study to underline its significance in this particular field.

3.4 Structure of popular scientific reports (PSR)

Based on the material I have used in my work, only one study exists that deals with the generic structure of PSRs. The generic structure of popular scientific reports within the move analysis framework has only been examined by Nwogu (1991). Nwogu's study deals with one type of scientific popularization, concretely with the Popularized Medical texts. His analysis has revealed that the structure of Popularized Medical texts is made up of nine moves, each of them fulfilling its particular purpose. The purpose of every move always influences its content and its constituent elements called "steps" by Swales, and also the **linguistic features** occurring therein. The purpose of a particular move is usually realized through the constituent elements and **linguistic features**. In addition to this, Nwogu's study identifies the typical ordering of these nine moves that organise the structure of Popularized Medical texts. Further details concerning Nwogu's study are introduced in the following section.

3.4.1 Nwogu's structure of Science Popularization

The main purpose of Nwogu's study was to characterize the patterns of discourse organisation of text falling within Medical Popularization. The study was concerned with the popularized medical text "referred to as "Journalistic Reported Version" (JRV) of professional medical research reports" (Nwogu, 1991:112). Within the work 15 articles from the field of medicine were examined.

Nwogu decided to base the structure of these research papers on Swales' model for analysis of genre. His intention was not to make a kind of replica of Swales' work, but to provide new information coming out of Swales' theory of "moves". In his study Nwogu clarified the term "move" as follows:

> By the term "move" is meant a text segment made up of a bundle of linguistic features (lexical meanings, propositional meanings, illocutionary forces, etc.) which gave the segment a uniform orientation and signal the content of discourse in it. Each […].
>
> (Nwogu, 1991:114)

The results obtained in Nwogu's study play a very significant role in terms of Science Popularization. His analysis revealed the following generic structure of JRV texts (steps have been deleted from the list):

Move one: Presenting Background Information

Move two: Highlighting Overall Research Outcome

Move three: Reviewing Related Research

Move four: Presenting New Research

Move five: Indicating Consistent Observations

Move six: Describing Data Collection Procedure

Move seven: Describing Experimental Procedure

Move eight: Explaining Research Outcome

Move nine: Stating Research Conclusions

According to Nwogu there exists a schema for popularized scientific texts. However, he also concluded that this schema is not fixed and its variations are possible (Nwogu, 1991: 115-116).

As it has been previously mentioned, the structure of popular scientific reports used in this study is based on Nwogu's structure, since, to my knowledge, his study is the only one that deals with the generic structure of Science Popularization. For that reason, the structure of PSRs is very similar to Nwogu's structure. However, it has been necessary to make several alternations. The modified structure used during the analysis of **grammatical features** is introduced afterwards.

4 The Modified Structure of Popular Scientific Reports

4.1 Description of moves and their possible grammatical features

As it has already been written Nwogu defined nine possible "moves" that organise the text in JRVs. Even though this study is based on his work, within the analysis of popular scientific reports only eight moves were identified to make up the text of PSRs. Based on my analysis the information in a text of popular scientific reports is organised according to the following moves:

Move 1: Purpose - to present the background of the research
Move 2: Purpose - to announce a recent finding of the research
Move 3: a) Move 3 - larger context:
Purpose - to provide general knowledge about the studied issue or fill the gaps in knowledge
b) Move 3 - limitation of ongoing or previous research:
Purpose - to inform about the limitations of the ongoing research or previous studies
c) Move 3 - previous study:
Purpose - to provide information about the related previous studies
Move 4: Purpose - to present new research and to explain the purpose of the research
Move 5: Purpose - to indicate research results in detail
Move 6: Purpose - to describe data collection procedures
Move 7: Purpose - to indicate the main research outcomes and to provide their description and explanation
Move 8: Purpose - to provide research conclusions and future implications of the research results

It was already said that the linguistic features are very important since they affect the process of how the message is received by the audience; moreover, some genres can be reliably identified only by their lexicogrammatical features (Listyany in Pospíchal, 4). According to Nwogu "moves and their constituent elements are determined partly by inference from context, but mostly by reference to linguistic clues in the discourse. " (Nwogu, 1991:114) In other words, this definition by Nwogu says

that in addition to determining a genre, **linguistic features** also determine moves. Therefore, the occurrences of some linguistic features that are typical of individual moves organising the text in popular scientific reports can be expected.

The following paragraphs are dedicated to the theoretical description of the moves. The lexical signals of individual moves as well as their expected grammatical features are also presented there. Grammatical features are only deduced from the purposes of moves and sometimes from identified lexical signals of individual moves. Moreover, these linguistic features can be most significant for popular scientific reports.

Since the identified grammatical features are described in detail in the practical part, the following paragraphs should not be understood as the results of the analysis.

4.1.1 Move 1

Move 1 is very often the initial move of PSRs (Popular Scientific Report), but its presence in the PSRs is not obligatory or necessary. Move 1 is very often a short statement about one sentence in length and usually occurs only once in the structure of the PSR.

The main function of Move 1 is to provide background information about the topic of discourse by presenting knowledge which in the context of the research can be regarded as holding true for a long period of time. That is characterised by:

Blue is sometimes not an easy colour to make. (n.28)

Lexical signals:

It has been found out that Move 1 does not have any specific lexical signals; therefore, no lexical signals of Move 1 were identified and presented here.

Expected grammatical features

Because the main purpose of Move 1 is to present background knowledge regarded as holding true for a long period of time, the use of the **simple present tense** can be expected as a linguistic feature in this move.

4.1.2 Move 2

Move 2 is quite important because it announces the main outcome of the research being popularized. The main purpose of Move 2 is to introduce the most important outcome of the research as well as to bring background information about the topic of discourse. It

can provide information about: the people involved in the research, what was discovered, found, created etc., what type of benefit this research brings.

Move 2 occurs almost always in PSRs and very often possesses the form of a brief statement, usually about one or two sentences in length. That is achieved by:

> *A new study finds that in the first few days of life babies produce cries that mimic the melodies of their native language.* (n.12)

Lexical signals:

Lexical signals identified in Move 2 are as follows: the lexical verb *find* and its synonyms and hyponyms; the noun *researcher* and its synonyms and hyponyms; the noun *study* and its synonyms; the adjective *new*.

Expected grammatical features

Since the main goal of PSR is to introduce recent scientific findings of the research and to bring background information about the topic of discourse, the **present perfect tense** or **present simple** might be expected as typical features of Move 2.

Another grammatical feature expected within move 2 is connected with one of its lexical signals, concretely with the lexical signal *find*. The word *find* falls into six most frequent "cognition verbs" taking that-clauses (Biber et al., 1999: 662). Therefore, the use of **that – clauses** can be also identified as one of its grammatical features.

4.1.3 Move 3

According to Nwogu, this move provides information only about the studies related to the research being reported and especially about their limitations.

Based on my analysis Move 3 is divided into 3 different moves:

1. Move 3 - larger context,
2. Move 3 - limitation of previous study or ongoing study
3. Move 3 - previous study.

Each of them fulfils its own purpose and for each move typical grammatical features should be expected. In general, Move 3 provides the information necessary for evaluating the contribution of the research in the concrete field.

1. Move 3 - larger context

Move 3 - larger context contains information which gives a non-specialist audience general knowledge about a studied issue. It can also contain new information that deepens the knowledge of potential readers in the concrete field of science. For this, Move 3 - larger context helps readers better understand the importance of the study. Its function is to express logical relations. That is realized by:

> *Valproic acid is an inhibitor of the enzyme hystone deacetylase located at the cell nucleus where the DNA is found.* (n.3)

Lexical signals:

Lexical signals identified in Move 3 - larger context are: the lexical verb *call* and its synonyms; the lexical verb *say* and its synonyms.

Expected grammatical features:

As Move 3 - larger context introduces general knowledge about a studied entity, the **present simple tense** should be used the most. In addition, **short passive construction**, commonly used in academic style to present objective view and to avoid mentioning an agent, may very often occur here. The use of short passive can be also influenced by the fact that in news journalists desire to save space (Biber et al.1999: 477). Therefore, the present simple and short passive can be expected as grammatical features of Move 3 - larger context.

The next aspect suggested as a characteristic feature of Move 3 - larger context is associated with its lexical signal *say.* The lexical verb *say* and its synonyms belong to the group of verbs called "communication verbs" (Ibid.,667). For that, **direct quotation** is expected as a grammatical feature in Move 3 - larger context.

2. Move 3 - limitation of ongoing or previous research

The main purpose of this move is to inform about the limitations of a research. It can contain details about the possible problems, unexpected failures during the research procedures, the inabilities to overcome any kind of difficulty, the absence of the elements that are important for research progress and the struggles with unclear aspects of a research.

In addition, this move is divided into two types. One type of the move is called the ongoing type move and provides information about the limitations of an ongoing

research. The second type is called the previous type move and informs about the limitations of previous research. For better understanding examples are given:

a) ongoing: *…deficits, but the mechanisms by which the sleep deprivation affects brain function remain unknown.* (n.4)

b) previous: *Results from a 2002 … However, most children´s symptoms returned when the medication was discontinued…* (n.24)

Lexical signals:

Lexical signals determined in Move 3 - limitation of ongoing or previous research are these: the contrastive conjunctions *but, although, however*; the adverb *not*; the noun *scientist* and its synonyms and hyponyms; the lexical verb *say* and its synonyms.

Expected grammatical features:

The general function of this move is to provide information about possible limitations of a research. Based on this finding the occurrences of **verbal and non-verbal negations** are expected as grammatical features of this move.

The occurrence of **contrastive conjunctions** is also expected as a grammatical feature since they have been already discussed as lexical signals in the Bachelor thesis (Stejskalová, 2010:20).

As it has been previously written this type of move is divided into two types: *ongoing* type move and *previous* type move. In ongoing type move, the **present simple tense** is supposed to be found as its typical feature because it deals with ongoing research, while in *previous* type move the **past tense** should occur since this move type is concerned with the previous studies carried out in the past.

The occurrence of **adverbials of time** is the fourth expected grammatical feature in Move 3 - limitation. Time adverbials are used to make clear when events happened and also to give background leading up to the current event. (Biber et al.,1999:777). Especially for these purposes they might be used in this particular move.

3. Move 3 - previous study

The main purpose of Move 3 - previous study is to provide information about previous studies related to the research being popularized. It may introduce details of earlier

outcomes or experts´ expectations, i.e. what they wanted to discover. Furthermore, the procedures of a previous research might be also described here. That can be realized by:

> *Scientists stumbled upon the Ardipithecus fossil in 1994 when graduate student found a single upper molar tooth …* (n.1)

This type of move is not very common and not many PSRs contain it.

Lexical signals:

Lexical signals defined in Move 3 - previous study are as follows: the lexical verb *find* and its synonyms; the noun *study* and its synonyms; the adjective *previous* and its synonyms.

Expected grammatical features:

Move 3 - previous study deals with research or studies carried out in past. For that reason, the occurrence of the **past tense** could be expected as a typical grammatical feature in Move 3 - previous study. The next expected grammatical feature in Move 3 - previous study is associated with its defined lexical signals, particularly with verbs *find* and *show*. Both are common in taking that-clause. Therefore, **that – clauses** may be defined as a grammatical feature of Move 3 - previous study.

4.1.4 Move 4

The basic functions of Move 4 are as follows: to present new research and to explain the purpose of the study. In addition, this move can indicate the actual researchers who directed the study. The most common information introduced in Move 4 is the publication of the research results. Move 4 may also provide information about the implications of the results or about the methods used to collect data.

To sum up all these facts it can be said that Move 4 is a kind of brief introduction of the research. It indicates a topic, describes the process of research and gives the readers a hint about a context of the following parts of the PSR.

Move 4 very often informs only about the possible publication of the research results. In this instance, it is only about one sentence in length. That is achieved by:

> *Results will be published in the February 2010 issue of Alcoholism: Clinical & Experimental Research.* (26.)

Within Nwogu's structure this last fact is not included in his description of Move 4.

Lexical signals:

Lexical signals found in Move 4 are: the lexical verb *publish* and its synonyms; the noun *researcher* and its synonyms; the noun *study* and its synonyms and hyponyms; the lexical verb *find* and its synonyms and hyponyms; the noun *journal*; the noun *issue*; the noun *findings* and its synonyms and hyponyms.

Expected grammatical features:

As it was previously written, Move 4 very often informs only about a publication of a particular research. In that instance, it uses the passive structure to avoid an agent and adverbial of place to identify a location of a publication; to provide information "where". (Biber et al.1999:785). Therefore, **short passive structures** and **adverbials of place** are expected as typical features of Move 4.

4.1.5 Move 5

Move 5 is usually concerned with the main outcomes of the research. For instance, it involves details about the particular observations, it may introduce interesting results obtained from the procedures of data collection in a study and it can also describe possible implications of a concrete invention. Therefore, Move 5 can be seen as the first attempt to report the important results of the research being popularized. That is realized by:

…Dutch students showed improvements in their ability to recognize… (n.8)

The following comment on Move 5 is regarded to its position. Since Move 5 is the first attempt to report the main research outcomes, it usually stands before Move 7. Move 7 also provides information about the research results but further underlines their significances. Move 7 is discussed later in this chapter.

Lexical signals:

Lexical signals identified in Move 5 are: the lexical verb *find*; the noun *researcher* and its synonyms and hyponyms; the noun *participant* and its hyponyms; the lexical verb *say*; the contrastive conjunctions *but, although*.

Expected grammatical features:

The main purpose of Move 5 is to indicate research results. For that reason, the **simple past tense** is supposed to be one of its characteristic features.

In the Bachelor thesis (Stejskalová, 2010:20) **contrastive conjunctions** were discussed as lexical signals of Move 5. Since they belong to the grammatical part their occurrence is also suggested as a grammatical feature of Move 5.

4.1.6 Move 6

The main purpose of Move 6 is to introduce the methods used during the research being reported. It provides a detailed discussion concerning the process of data identification, selection and delimitation and the procedure for experimentation. Furthermore, it provides information about the technology, tools and techniques used during the study and it can also inform about the subjects being examined.

In Nwogu´s structure the move concerned with methods used in the research is divided into two different moves, Move 6 and Move 7. Nwogu differentiated the description of Data Collection Procedures referring to Move 6 from the description of the Experimental Procedures taking place in laboratory, referring to Move 7. In modified analysis these two moves were linked together since there was no marked diversity found.

Lexical signals:

Lexical signals determined in Move 6 are these words: the noun *participant* and its hyponyms; the noun *researcher* and its synonyms and hyponyms; the noun *study* and its synonyms; the lexical verb *make* and its synonyms and hyponyms; the lexical verbs *analyze* and its synonyms and hyponyms.

Expected grammatical features

The main purpose of Move 6 is to describe data collection procedures realized in a concrete time in the past. On the basis of this fact, the frequent occurrence of the **past tense** is expected in Move 6 and also the **passive structure** to avoid the agent and to focus readers´ attention on the steps of procedures.

4.1.7 Move 7

Move 7 is primarily concerned with descriptions of the research outcomes. It presents details about the main observations made in a study, indicates their significance, interprets, justifies and contrasts the observations made in the research being reported with similar observations made in related studies.

In the process of indicating significance of the main research outcomes, writers of PSRs use two ways of stating it. One way can be compared to "deduction" of the results, as is illustrated by the following example:

In fact, what Ardipithecus tells us is that we as a human have been evolving to what we are today... (n.1)

The other way can be seen as a kind of "celebration" of the main results, as it is demonstrated by the following example:

"This is the first empirical demonstration that,… people are able to recognize meaning in a language they don't speak," said Gregory ... (n. 9)

Nwogu's structure does not deal with these two different types of introducing.

Move 7 can provide an explanation of the principles and concepts of the research results; it can present comments underlying the observations made during the research, comments of the researchers themselves on the obtained results or comments of other researchers on the obtained results.

The finding that Move 7 occurs in every popular scientific article is not surprising, because it contains important information dealing with the main outcomes of a study.

Move 7 does not have a fixed position in PSRs. However, as it has been already said in the description of Move 5, Move 7 usually stands after Move 5. It is due to the fact that Move 5 is the first move reporting the main research outcomes.

Lexical signals:

Lexical signals identified in Move 7 are the following: the lexical verb *find* and its synonyms and hyponyms; the lexical verb *say* and its synonyms and hyponyms; the noun *researcher* and its synonyms and hyponyms; the noun *study* and its synonyms; the noun *finding* and its synonyms; the contrastive conjunctions *but, however, although*.

Expected grammatical features

The purpose of Move 7 is to indicate the research outcomes and to provide their description and explanation. For that reason, the use of **present simple** forms to explain principles and concepts might be expected as a grammatical feature. Furthermore, Move 7 very often presents researchers´ comments in the form of **direct quotations**, which can also be considered as a typical linguistic feature in this concrete move.

The next expected grammatical feature might be connected with the lexical signal *find.* It was already mentioned in Move 2 that the lexeme *find* falls into the verbs common taking that-clauses. Therefore, the use of **that – clauses** may be suggested as grammatical feature in Move 7.

Frequent occurrence of **contrastive conjunctions** is also assumed, since they have been already defined as lexical signals of Move 7. Contrastive conjunctions fall into the grammatical part of the language. For that reason, their frequent occurrence is expected.

4.1.8 Move 8

Move 8 usually states contributions which the study has made to the particular field. It introduces possible implications of the research results, suggests the need for further studies or presents the aim of future studies. It can be realized by:

> *"We hope this new understanding will one day provide us with strategies to delay or even prevent, the development of Parkinson's disease."* (n.5)

Based on the analysis, Move 8 does not always occur in popular scientific articles. This finding is surprising since its main function is to provide research conclusions and to introduce future implications of the research results.

Lexical signals:

Lexical signals found in Move 8 are realized by: the lexical verb *show* and its synonyms and hyponyms; the lexical verb *say* and its synonyms; the noun *study* and its synonyms; the noun *researcher* and its synonyms and hyponyms; the noun *treatment* and its synonyms and hyponyms; the lexical verb *help* and its synonyms and hyponyms; the noun *findings* and its synonyms and hyponyms; the adjective *new*.

Expected grammatical features:

Because the purpose of Move 8 is to provide research conclusions and to state future implications of the research results, the use of the modal verb **will** to signal future time when informing about future implications is expected. Also, the frequent occurrence of **epistemic modal verbs** relating to possibility, necessity, or prediction could be defined as a linguistic feature in this particular move. According to the results of the Bachelor thesis, Move 8's lexical signal is the lexical verb *say* and its synonyms and hyponyms

relating to the reported speech. Therefore, **direct speech** can be identified as a grammatical aspect of Move 8. Finally, the **present simple tense** might be also identified as a grammatical feature since Move 8 introduces research conclusions.

To create the structure of popular scientific reports and to define the purpose of each move were considered as the essential steps for the analysis of grammatical features in individual moves. Also, the expectations of grammatical features play very important roles since they helped to make the analysis clearer and more concrete. The following practical part introduces the outcomes of the analysis.

5 Analysis of grammatical features in PSR

Corpus and Methodology

This study is based on the analysis of 35 popular scientific articles randomly collected from different fields and from 15 different sources: BBC, CNN, The New York Times, ScienceDaily, ScienceNews, EurekAlert, Nationalgeographic, Livescience, ScienceNow, SFGate, Yahoo News, Scientific Blogging, ABC Science, NewsScientist and Science A GoGo.

All popular scientific reports contain only the text analyzed. In each PSR, the structure is always introduced by marking the individual moves found in a concrete report. The pictures involved in PSRs were removed since they are not important for the purpose of the work. It is also needed to mention that this study is not focused on one specific field, which is in contrast with the work of Nwogu who concentrated his study only on Popularized Medical texts.

During the analysis special attention was focused on **grammatical aspects** in individual moves, more specifically on grammatical aspects including: grammatical categories of verbs e.g. tense, voice, negation, modality; types of clauses; adverbials; possible postmodifications of nouns; determiners; conjunctions and also direct speech, which is considered to be typical feature of popular scientific style. Each move was examined in detail to identify its typical grammatical aspects and to see if it contains grammatical aspects already assumed in part 4. It must be highlighted that when analyzing grammatical features the purposes of individual moves were always taken into consideration as well as the lexical signals defined in the Bachelor thesis. Therefore, it can be said that every grammatical feature was always identified according to the purpose of a particular move and that the occurrence of some grammatical features was also influenced by lexical signals defined in a particular move.

To be able to define a grammatical aspect as a typical grammatical feature of a particular move, the following condition was established: a grammatical aspect has to occur in one-third of identified moves - in one PSR certain moves may occur several times – when the condition was met, the grammatical aspect was identified as a grammatical feature of a particular move.

For analyzing each move within 35 PSRs the table with detailed descriptions was always created, including three types of basic information: the number of the analysed article, the analysed grammatical aspect considered as a characteristic feature of a particular move and the number presenting the occurrence of that grammatical feature in a particular move. Moreover, below each table three important details are introduced to support the results of the analysis: the overall number of defined moves, the number representing one-third of it and the number representing the occurrence of a concrete grammatical feature within 35 PSRs. All these tables are enclosed and introduced in the appendix.

Since one identical grammatical aspect very often occurs several times in the content of one move, all these individual grammatical aspects were considered as one occurrence of this concrete grammatical item. For better understanding the concrete example is provided. Passive structure was analysed in Move 3 - larger context. Particularly, in the article n.1 Move 3 - larger context occurs twice. In the first move there was no passive structure found (marked by number 0 in table 3.1), in the second move the passive structure was defined in two cases. These two occurrences of the passive structure were taken as one occurrence of the passive structure (marked by number 1 in table 3.1).

In some cases, the table introduces several grammatical features defined in a particular move, for example table 7 introduces two grammatical features: the simple present tense and the past simple tense. Each grammatical feature is differentiated by the use of different font styles. Moreover, when analyzing the occurrence of tenses, the table always contains all tenses found in a particular move. The tenses that were not defined as grammatical features are marked in italics and also commented in the practical part. On the following pages the results of the analysis are provided.

5.1 The grammatical features of Move 1

The overall number of Move 1s is 15. For that reason, a grammatical aspect had to occur in at least 5 moves to meet the established condition for being defined as a grammatical feature of Move 1. The occurrences of defined grammatical features in Move 1 are introduced in table 1. The comments on each grammatical feature follow.

Grammatical feature	Number of occurrences
Present simple tense	13x
Modal verbs: can; may	5x

table 1: grammatical features of Move 1

Comments on defined grammatical features

1. Simple present tense

The simple present tense referring to present time is mainly used to describe a state existing at the present time and to describe present habitual behaviour (Biber , 1999: 453). The state existing at the present time can be temporary or persist for a long time.

The frequent occurrence of simple present tense in Move 1 is influenced by its main purpose which is to present background knowledge regarded as holding true for a long period of time. Therefore, the function of the simple present tense within Move 1 is to describe a persistent state for a long period of time. That is realized by:

> *Children with fetal alcohol spectrum disorder (FASD) have a number of cognitive deficits…* (n.26)

The simple present tense had been expected as a grammatical feature in Move 1 before doing the analysis, and that expectation was confirmed by the results of the analysis.

The simple present tense was also defined as a grammatical feature in other 9 moves. Only in Move 6 it was not determined as a grammatical feature. In each move the simple present tense is used to describe a state existing for a long period of time. Therefore, only the most important findings considering the use of the simple present tense in a particular move are going to be commented.

Other tenses observed in Move 1:

Within Move 1 not only the simple present tense was found. Four types of Move 1, concretely in articles n.6, n.17, n.20, n.33, also contain the present perfect and two types of Move 1, particularly in articles n.6 and n.21, contain the past simple. In general, the present perfect refers to a situation that began in the past and continues to the present (Biber et al., 1999:460); and the past tense "describes a situation that no longer exists or an event that took place at a particular time in the past." (Biber et al., 1999:467)

It was written in the theoretical part that context plays very important role when doing the move analysis in hand; and context directly influenced the choice of tenses

within these moves. Move 1 in articles n.6, n.17, n.20 and n.33 describes the situations that began in past and continued to the present. Therefore, the present perfect was used. Move 1 in article n.6 talks about a past event, more accurately about a historic event, which is the reason for using simple past tense.

2. Modal verbs– *can, may*

Modals and semi-modals are divided into 3 main categories according to their meaning. The categories are following: 1. permission/possibility/ability; 2. obligation/necessity; 3.volition/prediction.

Moreover, each modal can have two types of meaning: deontic and epistemic. Deontic modality is related to permission, obligation and volition. On the other hand, epistemic modality usually relates to possibility, necessity, or prediction and they are very often used to avoid direct statements.

It was found out that the modal verbs *may* and *can* are common in Move 1. They main function is to express either possibility (epistemic modality) or ability (deontic modality). That is demonstrated by:

a) possibility:

It may be that when adults talk to babies, they use a language… (n.9)

b) ability:

… the human brain can think of a word, apply the rules of grammar… (n.10)

Move 1 usually provides background information about the research. However, during the analysis it was observed that Move 1 can also convey an assessment of possible finding, as it was illustrated above.

To sum up, the main purpose of Move 1 is to provide background information about the topic of discourse by presenting knowledge which in the context of the research can be regarded as holding true for a long period of time.

Its defined grammatical features are following: the simple present tense, the modal verbs *can, ma,* marking possibility or ability.

5.2 Grammatical features of Move 2

The overall number of Move 2s is 33. For that reason, a grammatical aspect had to occur in at least 11 moves to meet the established condition for being defined as a grammatical feature of Move 2. Table 2 shows the occurrences of defined grammatical features in Move 2. The comments on each grammatical feature follow.

Grammatical feature	Number of occurrences
Present simple	27x
Indefinite articles	24x
Locative expressions	18x
Present perfect	14x
That - clauses	13x

table 2: grammatical features of Move 2

Comments on defined grammatical features of Move 2

1. Present simple

Move 2 usually informs about the recent finding of the study being reported. For that reason, the simple present tense is used to underline that propositions are generally valid, regardless of time. It is illustrated in the following examples:

A new rodent study shows that newborn neurons destabilize… (n.19)

The present simple tense in Move 2 had been also expected as a grammatical feature before doing the analysis and on the basis of the results of the analysis, this expectation was confirmed.

Other tenses observed in Move 2:

The present perfect also occurs very often in Move 2. Therefore, the present perfect is discussed as a grammatical feature of Move 2 later. The simple past tense is used in seven types of Move 2, particularly within the articles n.1, n.6, n.7, n.26, n.28, n.31 and n.35. The simple past is used there to refer to events that happened in a concrete time of a research in the past and that were completed.

2. Indefinite articles *a/ an*

Indefinite article *a* is the indicator of quantitative or non-quantitative indefiniteness. The main function of the indefinite article is to introduce a new specific entity in discourse.

In Move 2 indefinite article *a / an* expresses existential quantification indicating "one". In other words, it indicates the singularity of a particular newly introduced entity being reported or a study being reported. That is realized by:

a) a newly introduced study: *A new study finds that, in the first few days…* (n.12)

b) newly introduced entity: *An 80-million-year-old fossil recently uncovered...* (n.7)

3. Locative expressions

Locative expressions occurring in Move 2 are in the following forms: adverbials of place; postmodifiers specifying the location of a noun.

During the analysis it was observed that the adverbials of place used in Move 2 very often convey position. They bring details about the location of a particular entity considered as a main outcome of a research or specify a place where a study is taking place. That is realized by following examples:

… astronomers have found 32 new planets outside our solar system… (n.2)

Researchers,… are the first to have cloned mice in Spain. (n.3)

Postmodifications by prepositional phrases are used to express the location of a researcher. They provide concrete information about researchers who participated in a study. It is illustrated by:

Now a team led by Zhonghe Zhou at the Chinese Academy of Science … (n.16)

4. Present Perfect

According to the use, present perfect is distinguished into four types: the continuative, the experiential perfect, the resultative perfect and the perfect of recent past.

In Move 2 the present perfect is usually used to express resent past events. This fact is associated with the main purpose of Move 2 which is to introduce recent scientific findings of the research being popularized. It is realized by:

European astronomers have found 32 new planets … (n.2)

The present perfect had been suggested as a grammatical feature of Move 2 before doing the analysis. This suggestion was confirmed by the results of the analysis.

5. That-clause in post-predicate position

The verbs taking that–clause in post predicate position fall into three semantic domains: mental verbs, mainly of cognition (e.g. *find, think, know*) and a few with

emotive/affective content (e.g. *hope, wish*); speech act verbs (e.g. *say*); and other communication verbs that do not necessarily involve speech (e.g. *show, suggest*).

The frequent occurrence of that-clauses in Move 2 is associated with one of its defined lexical signals, particularly with the lexical verb *find* and its synonyms and hyponyms determined as lexical signals of Move 2. It was previously written that the word *find* falls into the six most frequent "cognition verbs" taking that-clauses, concretely in a post-predicate position.

That-clauses within Move 2 usually provide information about the entity that has been found, determined or discovered, it is illustrated by:

> *A new study finds that in the first few days of life, babies produce cries that mimic the melodies of their native language.* (n. 12)

The frequent occurrence of that-clauses in Move 2 had also been expected as a grammatical feature of Move 2. The results of the analysis confirmed this expectation.

Move 2 usually informs about the recent finding which has been discovered by scientists. It can contain details such as what has been found, where it was found and by whom. Furthermore, Move 2 can also convey a possible contribution that the study has made to the field of science. For that reason, the main purpose of Move 2 is to announce a recent finding of the research being reported.

On the basis of the analysis Move 2's identified grammatical features are the following: the simple present tense, the present perfect, the indefinite article, adverbials of place, that-clauses.

5.3 Grammatical features of Move 3-larger context

The overall number of Move 3-larger contexts is 27. A grammatical aspect had to occur in at least 9 moves to meet the established condition for being defined as a grammatical feature of Move 3 - larger context. The occurrences of a grammatical features identified in Move 3-larger context are provided in table 3. The comments on each grammatical feature follow.

Grammatical feature	Number of occurrences
Present simple	24
Adverbial of place	17
Passive structure and the condensed passive	13

table 3: Grammatical features of Move 3-larger context

Comments on grammatical features of Move 3-larger context

1. Present simple

Move 3-larger context contains information that gives potential readers general knowledge. In other words, it provides further details that are usually in the way of describing basic facts about a particular studied entity. Therefore, the simple present tense describes a state persisting for a long time. That is realized by:

> *Alzheimer´ s disease is a degenerative, terminal form of dementia that affects over 35 million people world-wide.* (n.25)

Before doing the analysis, frequent use of the simple present tense in Move 3-larger context had been assumed. This assumption was confirmed by the results of the analysis.

Other tenses observed in Move 3-larger context:

Also, other tenses were found in Move 3 - larger context, concretely the simple past tense and the present perfect. The simple past tense occurs in Move 3 - larger context within the articles n.7, n.10, n.13, n.16, n.20 because of the articles' descriptions of events that took place at a particular time in the past. The present perfect is used in Move 3 - larger context in the articles n.12 and n.15 to describe situations that started in past and continue into the present. The type of present perfect used for that particular situation is also called continuative perfect (Huddleston & Pullum, 1990:141).

2. Adverbial of place

In Move 3 - larger context place adverbials are commonly used to describe a position of a studied entity. They usually convey "where" a particular entity is located, as demonstrated by the following example:

> *Oxidative stress occurs in injured nerve tissue …* (n.14)

3. Passive structures and the condensed passive

In general, passive takes two forms: the long passive where the agent is expressed in a *by* -phrase and the short passive where the agent is unexpressed. Furthermore, passive structures can occur in a form called "condensed passive" which is realized only by the past participle verb form.

Move 3 - larger context describes the basic facts about a particular entity that is studied by researchers. Therefore, the passive construction, mainly the short passive

construction, is used to convey an objective detachment from what is being described. Long passive constructions, used for expressing an agent, were found only in four cases of Move 3 - larger context, particularly in the articles n.1, n.6, n.10, n.31.

According to the analysis, a condensed passive functioning as a postmodifier also occurs in Move 3 - larger context. Its main purpose can be connected with journalists' desire to save space. Both types of passive construction, described above, are illustrated in the following example:

> *Valproic acid is an inhibitor of the enzyme histone deacetylase, located at the cell nucleus where the DNA is found.* (n.3)

The use of short passive constructions in Move 3 - larger context had been assumed before doing the analysis. This assumption was confirmed by the results of the analysis.

Before doing the analysis it had also been suggested that direct quotation could have been indentified as a grammatical feature of Move 3 - larger context. This suggestion was not confirmed by the results of the analysis.

Move 3 - larger context usually provides general information about a studied entity to non-specialist audiences. It can also contain new information that deepens the knowledge of potential readers in the concrete field of science and it can help readers better understand the importance of the study. Therefore, its main purpose is to provide general knowledge about the studied issue or fill the gaps in knowledge.

Grammatical features defined in Move 3 - larger context are: the simple present tense, adverbials of place, passive constructions and the condensed passive.

5.4 Grammatical features of Move 3 - limitation

The overall number of Move 3-limitations is 25. Therefore, a grammatical aspect had to occur in at least 8 moves to meet the established condition for being defined as a grammatical feature. Table 4 shows the occurrences of defined grammatical features in Move 3-limitation. The comments on each grammatical feature follow.

Grammatical feature	Number of occurrences
Verbal, non-verbal negation	21x
Present simple	18x
Contrastive conjunction	17x
Adverbials of place	10x
Modal verbs – can, could, may	9x

table 4: grammatical features of Move 3-limitation

Comments on grammatical features of Move 3-limitation

1. Verbal, non-verbal negation

Negation contains four main contrasts: verbal vs. non-verbal, analytic vs. synthetic, clausal vs. sub-clausal, and ordinary vs. metalinguistic. In terms of Move 3- limitation verbal negation and non-verbal negation is discussed.

Lexical verbs are negated by the use of an operator: *be, do,* or *have* which is followed by the adverb *not*, for example: *didn´t* connect, *have not* known, *is not* known. This type of negation is called 'verbal negation' and it gives negative meaning to the word or to the whole phrase.

The main purpose of Move 3-limitation is to inform about limitations of an ongoing research or a previous research. For that reason, the occurrence of 'verbal negation' is common. It is illustrated by:

"… Paleontologists really don´t know the answer to that …" (n.7)

Move 3-limitation also contains another type of negation, concretely **non-verbal negation; affixal negation**. This type of negation is a part of the lexical meaning and is created through the use of appropriate affixal negators, such as *un-, dis-, in-, ir-, non-* , *-less.,* as is seen in following examples:

… although it's impossible to rule out that they´re showing the results … (n.12)

… " we still have been troubling unable to pin it down… (n.10)

Verbal and non-verbal negations were defined as lexical signals of Move 3 - limitation in the Bachelor thesis (Stejskalová, 2010:26). Since they also fall into the grammatical aspects they were analysed within this work and identified as a grammatical feature of Move 3-limitation.

Verbal and non-verbal negation had been expected as a grammatical feature of Move 3-limitation prior to the analysis. This expectation was confirmed by the results of the analysis.

2. Present simple

It was already written in the theoretical part that Move 3-limitation is divided into two types: ongoing type move and previous type move. During the analysis of Move 3-limitation 21 moves of ongoing type were determined which is also associated with the

frequent use of the simple present tense. Also, ongoing type move very often informs about states persisting for a long time that are somehow limited or unknown, witch is realized by the use of simple present tense. That is realised by:

…the mechanisms by which sleep deprivation affects brain function remain unknown. (n.4)

Before doing the analysis, the simple present tense had been assumed as a grammatical feature of Move 3-limitation. This assumption was confirmed by the results of the analysis.

Other tenses observed in Move 3-limitation:

The present perfect was found in six cases of Move 3-limitation ongoing type, particularly within the articles n.4, n.10, n.14, n.19 and n.30. Move 3-limitation ongoing type in the article n.14 describes a recent past situation which is connected with the present. According to Huddleston (2002), this type of the present perfect is called the perfect of recent past. In other five cases the present perfect is used to describe situations that started in past and extends up to now also called the continuative perfect.

It was written above that the second type of Move 3 - limitation is previous move type which informs about the limitations of a previous research. This type of move was determined in the articles n.12, n.17, n.23 and n.24. All of them provide information about past events, more concretely about the research carried out in the past. Therefore, the past simple tense is used in these moves.

An occurrence of the past perfect progressive aspect was found in Move 3-limitation previous type, particularly in the article n.17. The past perfect progressive aspect is used there to refer to an action in progress that happened at a particular time prior to a previous research described in this move.

3. Contrastive conjunctions: but, although, however

The common function of contrastive conjunctions is to link two statements that are in contrast or to introduce a statement that shows surprise, annoyance or disagreement.

Move 3 - limitation very often presents negative reactions to the preceded idea introduced in different types of move. Based on the analysis, the preceded move is usually Move 7. For better understanding the example is illustrated:

M7 … *subtitles appear to have helped the participants to decipher … This did not, however, allow participants to retune* … M3 limitation (n.8)

Move 3 - limitation also uses contrastive conjunctions to show that one statement seems to be unexpected and alarming in relation to another statement. In this situation both ideas fall within one move, as can be seen in the following example:

Results … showed that antipsychotic medication risperidone reduced such behavioural problems … <u>However,</u> most children's symptoms returned (n.24)

The use of contrastive conjunctions was expected as a grammatical feature in the theoretical part since they had already been discussed within the Bachelor thesis (2010) and defined as lexical signals of Move 3 - limitation. Contrastive conjunctions fall into the grammatical part and for that reason, they were also analysed and afterwards identified as a grammatical feature of Move 3 - limitation.

4. <u>Locative expressions:</u>

Within Move 3 - limitation adverbials of place and postmodifications by prepositional phrases are use to describe location.

According to the analysis, adverbials of place occurring in Move 3 - limitation very often describe a position. They usually provide details such as "where" a concrete studied entity is located, that is realized by:

Wermke thinks babies learn the melody of the language <u>in utero</u>… (n.12)

In one case of Move 3 - limitation, particularly within the article n.14, the adverbial of place describes a direction from a point of origin towards a destination. It is demonstrated by:

… strategies have failed to move <u>from the laboratory to the clinic.</u> (n.14)

Postmodifications by prepositional phrases used in Move 3-limitation specify a scientist's location, "where" a concrete scientist is from. It is illustrated by:

Yi Cui, a materials scientists <u>at Stanford University in Palo Alto, California</u>… (n.17)

In the theoretical part it was suggested that adverbials of time could be defined as a grammatical feature in Move 3-limitation. This suggestion was not confirmed by the results of the analysis.

5. Modal verbs: *can, could* and *may*

On the basis of the analysis modal verbs with epistemic and also deontic meaning occur in Move 3 - limitation, concretely modal verbs: *can*, *could* and *may*. Their main function is to express logical possibility (epistemic modality) or ability (deontic modality), as can be seen from the following examples:

a) ability:

…there are none that can slow down or halt the progression of desease… (n.5)

b) logical possibility: *… stars listed in the study as having no detected planets, could actually have planets that simply haven't been detected yet.* (n.30)

Move 3-limitation informs about the facts that are somehow limited or unknown in ongoing research or about the facts that were unclear and complicated in the previous research. For that reason, the main purpose of Move 3 - limitation is to inform about the limitations of an ongoing research or previous studies.

Grammatical features identified as characteristic features for Move 3-limitation are: the simple present tense, verbal and non-verbal negation, contrastive conjunctions, adverbials of place, modal verbs with epistemic meaning.

5.5 Move 3-previous study

The overall number of Move -previous studies is 9. A grammatical aspect had to occur in at least 3 moves to meet the established condition for defining it as a grammatical feature of this move. Table 4 shows the occurrences of defined grammatical features in Move 3-previous study. The comments on each grammatical feature follow.

Grammatical feature	Number of occurrences
That - clause	5x
Simple present tense	4x
Past simple	4x
Present perfect	4x
Modal verb – would	3x

table 5: grammatical features of Move 3-previous study

Comments on grammatical features of Move 3-previous study

1. That – clauses: post-predicate position

Common occurrence of that-clauses in Move 3 - previous study is influenced by its lexical signals. The verbs *find* and *show* were identified as lexical signals of Move 3 -

previous study, and as it was written in part 5.2.1 when dealing with that-clauses in Move 2, these verbs are common in taking that-clauses in post-predicative position.

That–clauses used in Move 3 - previous study usually conveys findings obtained from a previous study or studies. That is realized by:

Previous experiments have found that we use what we already know about a language… (n.20)

The use of that–clauses had been assumed as a grammatical feature of Move 3-previous study before doing the analysis. This assumption was confirmed by the results of the analysis.

2. Past simple

Move 3 - previous study usually provides information about the research carried out in the past. On that account, the past simple occurs very often in Move 3-previous study to describe an event happening in a particular time in the past. It is illustrated by:

…Researchers… , first explored the concept 2 years ago. They cast a thin film of cellulose - - the same starting material used to make paper- - and laid it over conductive carbon nanotubes. … (n.17)

The simple past tense had been suggested as a grammatical feature of Move 3 - previous study before doing the analysis. This suggestion was confirmed by the results of the analysis.

3. Simple present tense

On the basis of the analysis it was found out that Move 3-previous research sometimes conveys outcomes from the previous studies that are beneficial for the research being reported. Therefore, the simple present tense is used to describe a state existing at the present time, as can be seen in the following example:

"From studies of brain function, we know that the parietal brain regions are involved in mathematics and number tasks,"…. (n.26)

The finding that the simple present tense is a grammatical feature of Move 3 - previous study was really surprising since this move provides details about previous studies. For that reason, only the occurrence of the simple past tense had been previously expected.

4. Present perfect

It has already been said that the present perfect is commonly distinguished into four types according to its use: the continuative perfect, the experiential perfect, the resultative perfect and the perfect of recent past.

In Move 3 - previous study the present perfect is used to describe the continuing validity of earlier findings. Therefore, it represents the continuative perfect type of the present perfect. It is demonstrated by:

Previous experiments have found that we use what we already know… (n.20)

Other tenses observed in Move 3-previous research:

During the analysis of Move 3 - previous study the occurrence of the past perfect was observed, concretely in the article n.18. This move introduces previous studies as well as the results of the experience that happened before these previous studies. For that reason, past perfect is used there to refer to a time before a past time.

5. Modal verb – would

The modal verb *would* is very commonly used to express prediction or personal volition. Particularly in Move 3 – previous research the modal verb *would* marks epistemic modality. Its main function refers to prediction of future action. More concretely, it is used to express scientists´ expectations of results. It is illustrated by:

Previous studies have taken small samples of cigarette tobacco and placed them in cultures to see whether bacteria would grow.

Move 3 - previous study brings details about a previous study or studies related to the research being reported. It can introduce outcomes from these previous studies that are beneficial for the research being reported or it describes experts´ expectations of research results. In addition, procedures used in earlier studies may be also described in this concrete part. Therefore, the main purpose of Move 3 - previous study is to provide information about the related previous studies.

Grammatical features defined in Move 3 - previous study are: that – clauses, the simple present tense, the past simple tense, the present perfect, the modal verb *would*.

5.6 Move 4

The overall number of Move 4s is 36. For that reason, a grammatical aspect had to occur in at least 12 moves to fulfil the condition for indentifying it as a grammatical feature. The occurrences of grammatical features identified in Move 4 are provided in table 5. The comments on each grammatical feature follow.

Grammatical feature	Number of occurrences
Locative expressions	32x
Simple present tense	23x
Short passive	22x

table 6: grammatical features of Move 4

Comments on grammatical features of Move 4

1. Locative expressions

Move 4 very often informs only about the publication of a particular research. Therefore, the main use of adverbials of place is to identify the location where a potential reader can find details about that particular outcome(s). That is realized by:

The research,… is detailed in the Nov. 26 issue of the journal Nature. (n.18)

It also uses postmodification by prepositional phrase to provide further details about the researchers carrying out the study, more concretely "where" the scientist is situated, it is illustrated by:

The study, conducted by… researcher and microbial ecologists at the Ecole Centrale de Lyon in France… (n.22)

Adverbials of place had been expected as a grammatical feature of Move 4 before doing the analysis. This expectation was confirmed by the results of the analysis.

2. Short passive constructions and the condensed passive

Since Move 4 very often informs only about the publication of a particular research and it is usually only about one sentence in length, the short passive is commonly used. This type of passive enables the writer to omit an agent already known from the previous text.

During the analysis it was also observed that the use of the condensed passive realized by past participle and functioning as a postmodifier of a noun is very frequent. It can be influenced by the journalistic desire to save space. It is illustrated by:

The new electrode study, detailed in the Oct. 16 issue of the journal Science, has set scientists one step closer… (n.10)

Five occurrences of condensed long passive construction were also found within the analysis, concretely in the following articles: n.18, n.22, n.24, n.29, n.30. Since Move 4 in these articles introduce institutes responsible for studies or the main researchers conducting studies, i.e. they mention an agent, a condensed long passive structure is used. It is determined by:

The scientists, led by Sunil Kochhar of the Nestle Research Centre in Switzerland … (n.29)

Short passive structure had been assumed as a grammatical feature of Move 4 prior to the analysis. This assumption was confirmed by the results of the analysis.

3. Present simple

Move 4 very often provides a brief introduction of the research being reported. It defines a topic, describes the process of research and gives readers clue about a context of the report. For that reason, the simple present tense underlines the present of a research being reported and conveys the idea that the researchers´ propositions are true, regardless of time. That is realized by:

In a new study, published in … Mitterer and James McQueen show how you can improve your second language listening… (n.8)

Other tenses observed in Move 4:

During the analysis of Move 4 the past simple, the past perfect, the future tense marked by modal verb *will* and the present continuous were also determined.

Past tense occurs in seven types of Move 4, more concretely in the articles: n. 5, n.9, n.13, n.20, n.23, n.24, n.32. It was observed that individual studies introduced in these moves are described as past events that took place at a particular time in the past.

Five types of Move 4 (in the articles: n.1, n.6, n.7, n.26, n.27) talk about future facts, in particular about a possible publication of research results in the near future. For that reason, the future tense marked by the modal verb *will* is used in these moves.

In four types of Move 4 the present perfect was found. In the articles n.10 and n.30 the present perfect describes the situation taking place at some indefinite time in past, which is called the non-continuative perfect. In the articles n.12 the present perfect

is used to describe a situation that started in the past and extends up to now, which is called the continuative perfect. In the article n.34 the present perfect describes continuative perfect in one clause and the non-continuative perfect in the second clause. Both types of present perfect were described previously.

In general, it can be concluded that the present perfect used in these individual moves supports the present of a research being reported.

A few occurrences of present continuous were also identified in Move 4 (in the articles n.3, n.15). The progressive aspect is usually used to describe activities or events that are in a progress at a particular time (Biber et al, 1999:470). Therefore, the present continuous occurring in these moves underlines the incompleteness of a research being reported, in other words, it describes that a particular research is still in progress.

Move 4 commonly serves as a kind of brief introduction of a particular research. It presents the new research, explains the purpose of the research and sometimes also introduces the institute taking responsibility for the study or the main researcher of a particular study. However, the most frequent piece of information provided by Move 4 is about the possible publication of research results. Therefore, the main purpose of Move 4 for is the following: to present new research and to explain the purpose of the research.

Grammatical features defined in Move 4 are: adverbials of place, short passive constructions, the simple present tense.

5.7 Move 5

The overall number of Move 5s is 42; therefore, a grammatical feature had to occur in at least 14 moves to fulfil the condition for being indentified as a grammatical feature of Move 5. The occurrences of grammatical features identified in Move 5 are provided in table 6. The comments on individual grammatical features follow.

Grammatical feature	Number of occurrences
1. Present simple	30x
2. Past simple	29x
3. Relative clauses	28x
4. Passive structure, condensed passive	17x
5. That – clause	17x
6. Adverbial of place	15x
7. Contrastive conjunctions	14x

table 7: grammatical features of Move 5

Comments on grammatical features of Move 5

1 Present simple

Move 5 usually introduces the main outcomes of a research. It provides further details about the studied entity and informs about the possible implications of a concrete research finding. Therefore, the use of simple present tense emphasizes that researchers´ propositions are true, regardless of time. Moreover, it allows that research results can be read at any time from the perspective of their present. It is illustrated by:

> *Mitteerer and McQueen show that listeners can tune in to unfamiliar regional accent in a foreign language.* (n.8)

This concrete function is called as "the timeless use of the present" (Huddleston & Pullum,2002: 129).

Other tenses observed in Move 5:

Since the past simple tense is also used very often in Move 5, it is discussed later as a Move 5 grammatical feature.

During the analysis two occurrences of the present perfect were found, concretely in the articles n.6 and n.7, as well as four occurrences of the past perfect, specifically in the articles n.15, n.19, n.20 and n.28. The use of these tenses is influenced by the situations being described.

The present perfect tense in Move 5 describes recent past events also called the 'recent perfect type' of the present perfect. The past perfect in Move 5 refers to an event happening at a time that is earlier than event taking place at some specified time in past.

2. Past simple

The main function of move 5 is to introduce research findings or individual data obtained from the procedures of data collection in a study. Therefore, the past simple in Move 5 is used to refer to a past time. It describes actions of a study being reported that took place at a particular time in past. It is realised by:

> *… both groups improved over the six-month trial, the group receiving combination therapy showed greater reduction in disruptive behaviour…* (n.24)

The past simple had been suggested as a grammatical feature of Move 5 before carrying out the analysis. This suggestion was confirmed by the results of the analysis.

3. Relative clauses: finite / non-finite

Relative clauses can be formed using eight different relativizers: *which, who, whom*, *whose, that, where, when*, and *why.* The most frequent forms are by *that*, *which* and *who*. Non-finite relative clauses are divided into three major types: to- clauses, ing-clauses, ed-clauses. The last two types are also called participle clauses. (Biber et al,1999: 608)

In Move 5 finite relative clauses are usually formed by relativizers: *that, which*. Non-finite relative clauses occurring in Move 5 are realized by participle clauses, including ing – clauses and ed-clauses.

Almost all relative clauses occurring in Move 5 postmodify a particular noun referring to a studied entity important for a research and convey some details about it. It can be seen in the following examples:

a) finite relative clause:

The electrodes help surgeons locate the parts of the brain that cause epileptic seizures … (n.10)

b) non-finite relative clause:

…the primordial value – the amount produced in the big bang. (n.30)

According to the analysis only two occurrences of relative clauses formed by relative pronoun *who* were found, concretely in the articles n.3 and n.10. Both relative clauses provide some information about researchers participating in a study.

4. Short passive structures and the condensed passive

Because the most important information introduced by Move 5 concerns research outcomes, the main function of the short passive structures is to omit known researcher(s) mentioned already and to focus attention on the research outcomes obtained from the procedures of data collection. In addition, it also provides a more objective view from what is being described. That is realised by:

… Disproportionately large increases were observed in the hip internal rotation torque… (n.32)

During the analysis it was found out that the condensed passive also often occurs in Move 5. The reason for using condensed passive constructions may be influenced by

journalistic desire to save space. The occurrence of long passive structures was not identified in any Move 5.

5. That-clause in a post-predicate position

The frequent occurrence of that-clauses in Move 5 is influenced by its defined lexical signal, particularly by the lexeme *find* and its synonyms and hyponyms.

Moreover, Move 5 very often presents researchers´ opinions and expectations realized by the use of the lexical verbs *believe* and *think*. Both verbs belong to the group of verbs commonly taking that – clause in post-predicate position.

That – clauses in Move 5 report scientists´ thoughts, expectations or they convey particular results obtained from the procedures of data collection, which is illustrated by the following examples:

a) researchers´ thoughts:

… the team believes that the cognitive deficits caused by sleep deprivation …, may be reversible by reducing the concentration of a specific enzyme… (n.4)

b) results obtained from the procedures:

They found that those with the disease had variants of the genes… (n.5)

6. Locative expressions: adverbials of place

In Move 5 location is described especially through adverbials of place. Adverbials of place occurring in Move 5 are commonly used to describe concrete locations. They specify a position of a studied entity, which is demonstrated by:

Ardipithecus ramidus, nicknamed "Ardi," is a hominid species that lived 4.4 million years ago in what is now Aramis, Ethiopia … (n.1)

They can also identify a position of an important research finding, which is realised by:

… but pieces soaked in samples with high iron content reeked of fish. (n.33)

In order to specify location, two cases of postmodification by prepositional phrases were also found in Move 5, concretely in the article n.3 and n.19. Both convey further details about a researcher carrying out the study. That is realized by:

…say researchers who were in charge of cloning the mice, Nuno Costa-Borges, Josep Santaló and Elena Ibáñez from the Department of Cell Biology, Physiology and Immunology at UAB. (n.3)

7. Contrastive conjunctions: but, although, however

It was previously written in part 5.4.1 that main function of contrastive conjunctions is to connect two contrastive statements or to introduce a statement that shows surprise, annoyance or disagreement.

In Move 5 contrastive conjunctions, concretely *but* and *although*, are used to connect two statements that contrast. In addition, the clauses containing a contrastive conjunction usually introduce a new research finding. It is illustrated by:

> *Scallops dunked in vino with low iron content smelled normal, but pieces soaked in samples with high iron content reeked of fish.* (n.33)

Contrastive conjunctions had already been defined as lexical signals in the Bachelor thesis (Stejskalová, 2010). Since they are grammatical aspects, they were also taken into account in this study and defined as grammatical features of Move 5.

Move 5 deals especially with the research findings and its main purpose is to indicate research results in detail. It presents outcomes obtained from the procedures of data collection, it provides further details about studied entity and it can also inform about possible implications of a concrete research finding. Sometimes researchers´ opinions or expectations of the research results are introduced there.

Grammatical features defined in Move 5 are the following: the simple present tense, the past simple, relative clauses, passive structures and the condensed passive, that-clauses, adverbials of place, contrastive conjunctions.

5.8 Move 6

The overall number of Move 6s is 47; therefore, a grammatical aspect had to occur in at least 15 moves to fulfil the condition for being indentified as a grammatical feature. Table 6 introduces the occurrences of grammatical features identified in Move 6. The comments on individual grammatical feature follow.

Grammatical feature	Number of occurrences
Past simple	38x
Passive structure and condensed passive	38x
Relative clauses: finite, non-finite	31x
Locative expressions:	24x
Infinitive of purpose	16x

table 8: Grammatical features of Move 6

Comments on grammatical features of Move 6

1. Past simple

Move 6 mainly informs about the methods used during the research being reported and about the process of data identification. Therefore, the past tense used in Move 6 refers to a past time. It describes the events of research procedures and data collection that happened at a concrete time in the past. Moreover, in Move 6 the time adverbial *then*, which marks a progression of the procedures, occurs very often with the simple past tense. It can be seen in the following example:

Researchers then treated the mice with PDE inhibitors… (n.4)

The past simple had been expected as s grammatical feature of Move 6 before doing the analysis. This expectation was confirmed by the results of the analysis.

Other tenses observed in Move 6:

During the analysis, the occurrence of the present simple tense was determined in 11 types of move 6 (the occurrence of the present simple is marked in table 8 included in the appendices, however, it was not defined as a grammatical feature of Move 6). In Move 6 it is used when providing further details about a technology used in the study, an entity needed for the study being reported or when describing a particular process of data collection. The use of the present simple tense may help to make these descriptions clearer to the potential readers.

The past perfect occurs in five types of Move 6, concretely within the articles n.3, n.8, n.19, n.20, n.26. It is used to express the sequence of events that a particular step of data collection happened earlier than another one.

The present perfect was found only in one type of Move 6, particularly in the article n.1. The present perfect used in this move expresses the experiential perfect, i.e. to refer to the occurrence of situation within a time-span up to now.

The occurrence of present continuous was observed in two types of Move 6, namely in article n.10 and n.20. In both situations present continuous expresses the activity that was in a progress at a particular time of a study.

2. Passive structures and the condensed passive

Since the main purpose of Move 6 is to describe research data collection, the passive structure is primarily used to emphasize the processes of these procedures. Moreover,

the majority of the passive structures take the form of the short passive to avoid mentioning the specific researcher(s) and to present objective detachment from what is being described.

The use of the so called "condensed passive" is associated with the occurrence of non-finite relative clauses realized by participle clauses (they are discussed later as a grammatical feature of Move 6) and also with the author's desire to save space. Both grammatical aspects are illustrated in the following example:

After this exposure, participants were asked to repeat back as many words as they could from 80 audio excerpts taken from each source… (n.8)

Only two occurrences of long passive structures were determined, concretely in the articles n.2 and n.3. The long passive structure occurring in these articles is used to mention the initiator of a particular action realised during the research being reported.

The discoveries were made by the High Accuracy Radial Velocity Planet Searcher… (n.2)

Prior to the analysis, passive structure had been assumed as a grammatical feature of Move 6. On the basis of the results this assumption was confirmed.

3. Relative clauses: finite, non-finite

It has already been written in the part 5.6 when discussing relative clauses as a grammatical feature of Move 5 that finite relative clauses can be formed by the use of eight different relative pronouns and that non-finite relative clauses are divided into participle clauses, including ing – clauses, ed-clauses; and to - clauses.

Finite relative clauses used in Move 6 are formed by the relativizer: *that, which* and *who*; non-finite relative clauses are realized by participle clauses.

According to the analysis, non-finite relative clauses as well as finite relative clauses formed by the reletavizer *that* or *which* usually provide further details about techniques used in the research being reported or they bring details about the studied entity. That is realized by:

a) conveying details about the studied entity:

Researchers then treated the mice with PDE inhibitors, which rescued the sleep deprivation… (n.4)

b) conveying details about the technique used in the research

… participants were asked to repeat back as many words as they could from 80 audio excerpts taken from each source… (n.8)

Finite relative clauses using the relative pronoun *who* bring some information concerning participants of a study or researchers carrying out the study. That is demonstrated by:

The researchers used DTI to scan 21 children (12 boys, 9 girls), five to 13 years of age, who had been diagnosed with FASD in an earlier study;… (n.26)

4. Locative expressions

In Move 6, adverbials of place and also postmodification by prepositional phrase are used to express a location or direction. Since Move 6 mainly informs about the processes of research procedures, locative expressions specify the location of a concrete tool or entity used within the research process of data collection. That is illustrated by:

… signals sent by electrodes implanted in the brains of epileptics. (n.10)

They can also specify scientists´ or participants´ position. More concretely, they convey with what position scientists or participants involved in a study are connected, in other words "where" they are from. That is realized by:

UCSD's Alison Marsden has been working with surgeons at Rady Children's Hospital and Stanford University… (n.27)

Furthermore, locative expressions used in Move 6 also provide details about an origin of a studied entity such as "where" a studied entity is from. It can be seen in the following example:

The researchers recorded four utterances from each of eight English-speaking mothers… (n.9)

5. Infinitive of purpose

It has already been said that Move 6 is dedicated to the research procedures of data collection. It contains information about tools, technologies or techniques used within the study being reported.

The frequent occurrence of infinitives of purpose may be associated with the fact that popular scientific reports are presented to a potential non-specialist audience. Therefore, explanation such as "why" a particular process of data collection was realized is appropriate to support readers' understanding of the research. That is demonstrated by:

> *… participants listened to recordings of a male voice … and had to press a button to indicate which sound they heard…* (n.18)

Move 6 is focused on the methods used in the research being reported. Therefore, it contains information providing further details about tools, techniques or technologies used in a study; it describes the process of data collection that happened in a concrete time in the past; and it explains the purpose of a particular step of data collection to make the study more understandable to a potential non-specialist audience. On the basis of these findings the purpose of Move 6 is defined as follows: to describe data collection procedures.

Grammatical aspects identified as grammatical features of Move 6 are following: the past simple; passive structures and the condensed passive; finite, non-finite relative clauses; locative expressions: adverbials of place, postmodification by prepositional phrases; infinitives of purpose.

5.9 Move 7

The overall number of Moves 7s is 82; therefore, grammatical aspect had to occur in at least 27 moves to fulfil the condition for being indentified as a grammatical feature. Table 7 introduces the occurrences of grammatical features defined in Move 7. The comments on individual grammatical feature follow.

Grammatical feature	Number of occurrences
Simple present tense	73x
Past simple tense	51x
Locative expressions	44x
That-clauses	42x
Relative clauses: finite, non-finite	37x
Passive structure and condensed passive	35x
Direct quotation	33x
Contrastive conjunctions	27x

table 9: Grammatical features of Move 7

Comments on grammatical features of Move 7

1. Present simple

The simple present tense occurring in Move 7 helps to support the truth of the research outcome(s), regardless of time and it allows that research results can be read at any time from the perspective of their present. It is illustrated by:

The results show that the parent training intervention can be delivered… (n.24)

It was also observed that the simple present tense is used when describing and explaining the significance of a concrete finding to make it clearer to a potential non-specialist audience. These descriptions are usually in the form of a citation.

"… we believe the enzyme blockers act directly at the trauma site, which is important because nerves can be extremely long and the trauma can disrupt signaling," says Langley (n.14)

Simple present tense had been expected as a grammatical feature of Move 7 before doing the analysis. This expectation was confirmed by the results of the analysis.

Other tenses observed in Move 7:

Frequent occurrence of the past simple tense was also observed during the analysis. For that reason, the simple past tense is discussed later as a grammatical feature of Move 7.

The present perfect was defined in 12 types of Move 7, particularly in the articles n.2, n.3, n.7, n.8, n.26, n.27, n.28, n.33, n.34, .35. The main reason for the use of the present perfect is to describe the situations that continue to the present time, more specifically to describe a process of a study that took place at some indefinite time in past which has an effect on the present.

The occurrence of the future time marked by the modal verb *will* was observed in the four types of Move 7, concretely in the article n.12, n.34 and n.35. The modal verb *will* used in these types of Move 7 expresses a future fact, more concretely what type of event the research finding will or will not cause.

The occurrence of the past perfect was found in 4 types of Move 7, concretely in the articles n.8, n.19, n.22, n.34. The past perfect is used there to describe the sequence of research operations realized in a concrete time in past; to express that a concrete process happened earlier than the other one.

In addition, the modal verb *would* was found in the five types of Move 7, particularly in the articles n.16, n.18, n.27 and n.30. The main function of the model verb *would* occurring in these types of Move 7 is to express the prediction of the action coming out of the research findings.

2. Past simple

Move 7 provides the information concerning the outcomes of a study and also observations realised during the processes of data collection. The frequent use of the past simple is influenced by the fact, that the processes were done and completed during the research at a concrete time in the past. Therefore, the past tense used in Move 7 refers to a past time. That is realized by:

… *patients practicing Tai Chi exhibited a significant decrease in knee…* (n.11)

3. Locative expressions: adverbials of place; postmodification by prepositional phrases

The locative expressions used in Move 7 identify a position of an important item that is studied during a research or a location where a significant change was observed. They are also used to provide further details about persons participating in a study, including researchers and participants. Both situations are described as follows:

a) further details about persons:

… *psychologist at the University of British Columbia in Canada.* (n.12)

b) an important item:

We were quite surprised to identify such a wide variety of human bacterial pathogens in these products,"… (n.22)

4. That – clauses

The lexical verb *find* and its synonyms and hyponyms and the lexical verb *say* and its hyponyms and synonyms were identified as lexical signals of Move 7. According to Biber, all these verbs are notably common in taking that-clauses in post-predicate position which explains the frequent occurrence of that- clauses in Move 7.

That-clauses occurring in this part provide details about concrete research results obtained from the procedures of data collection. That is realized by:

The two teams later compared their data and found that variants… (n.5)

The frequent occurrence of that-clauses had been suggested as a typical grammatical aspect prior to the analysis of Move 7. This suggestion was confirmed by the results of the analysis.

5. Relative clauses: finite, non-finite

Finite relative clauses found in Move 7 are formed by the following relativizers: *that*, *which* and *who*. Non-finite relative clauses identified in Move 7 are realized by participle clauses such as ing – clauses and ed-clauses.

Move 7 very often describes a significant finding and explains its contribution to a particular field of science. For that reason, non-finite relative clauses and also finite relative clauses that are formed by relativizers *that* and *which* convey further details about a concrete finding. It is illustrated by:

The operation essentially connects the veins that would normally bring blood into the right side of the heart … (n.27)

Finite relative clauses formed by the relativizer *who* contain information specifying participants involved in a study or details about researchers carrying out the study. That is demonstrated by:

… the team of paleontologists who discovered the young adult fossil. (n.7)

6. Passive structures and the condensed passive

During the analysis it was found out that the only short passive and the condensed passive occur in Move 7. There was not identified any occurrence of long passive constructions.

Move 7 introduces an important research outcome gained from the procedures of data collection. Therefore, the main purpose of short passive structures and the condensed passive used in Move 7 is to avoid mentioning an initiator of an action and to focus attention on the important research events. That is demonstrated by:

If an English word was spoken with a Scottish accent, English subtitles … (n.8)

The use of short passive constructions and the condensed passive is also influenced by the journalistic desire to save space.

7. Direct speech

The common use of direct speech in Move 7 is associated with the lexical verb *say* and the words with similar meaning that were defined as lexical signals of Move 7. Moreover, the main function of these lexical signals is to introduce reported speech.

The main purpose of direct speech is to involve researchers´ voices into a particular article and to keep the authentic attitude of a writer. More specifically, by the use of direct speech the author of an article does not take responsibility for the researcher´ s statement.

Direct speech occurring in Move 7 primarily introduces the scientist's proposition concerning the research findings. It may convey explanations of their significance in a concrete field of science and it can also provide a description of some further details related to the research results. Therefore, its main purpose is to keep authentic attitude of a writer when introducing the significant points of a study being reported. That is realized by:

> *"Our findings demonstrate a link between brain structure and cognition that provides insight into how the FASD brain works," said Lebel,…* (n.26)

8. Contrastive conjunctions: but, however, although

The function of contrastive conjunctions in Move 7 is to connect two contrastive statements that occur in one identical move. These statements are usually associated with a concrete finding which is considered by scientists to be surprising. Therefore, these contrastive statements mainly show surprise, as is determined by the following example:

> *"We were extremely surprised to find that inhibiting a subset of HDACs not only promotes … but causes them to regenerate,"…* (n.14)

Contrastive conjunctions had already been defined as lexical signals of Move 7 in the Bachelor thesis (Stejskalová, 2010). Since they belong to the grammatical part of the language, they were also taken into account within this study and defined as grammatical features of Move 7.

Move 7 is focused on the results of the research being reported. It introduces important findings in a celebratory or deductive way; it provides descriptions of research findings and explains their significances in a concrete field of science. Move 7 also introduces researchers´ propositions concerning a particular research outcome.

Grammatical features defined in Move 7 are the following: the simple present tense, the simple past tense, locative expressions, that-clauses, relative clauses (finite, non-finite), passive structures and the condensed passive, direct quotations, contrastive conjunctions.

5.10 Move 8

The overall number of Moves 8s is 82; therefore, a grammatical aspect had to occur in at least 27 moves to fulfil the condition for being indentified as a grammatical feature. Table 8 introduces the occurrences of grammatical features defined in Move 8. The comments on individual grammatical feature follow

Grammatical feature	Number of occurrences
Simple present tense	27x
Direct quotation	20x
Locative expressions	16x
Short passive	11x
Modal verbs	13x

table 10: grammatical features of Move 8

Comments on grammatical features of Move 8

1 Present simple

Move 8 very often introduces the facts coming out from the study such as research conclusions about possible contributions of the research results. Therefore, the simple present tense used in Move 8 supports the idea that scientists´ propositions concerning the research findings are true, regardless of time, which is illustrated by:

Our observations emphasize a need to further evaluate … (n.11)

Moreover, it may also describe a fact existing at the present time. That is realized by:

…we´ ve shown that pack of cigarettes is loaded with bacteria, … (n.22)

In the two sentences the present simple tense is used; however, they talk about the future. That is realised by the use of a concrete adjective which refers to a future time.

… future work on this target protein promises to reveal … (n.4)

“ Future studies may also look for ways … (n.24)

The simple present tense had been suggested before doing the analysis. This suggestion was confirmed by the results of the analysis.

Other tenses observed in Move 8:

During the analysis five occurrences of the future time marked by the modal verb *will* were identified, concretely in the articles n.10, n.13, n.19, n.22, n.34. All these examples talk either about researchers´ predictions of future studies or their volition to continue in a study. For that reason, the future time marked by modal verb *will* is used.

The use of the modal verb *will* to signal future time had been expected as a grammatical feature of Move 8. This expectation was not confirmed by the results of the analysis.

Also, the six occurrences of the present continuous were identified, particularly in the articles n.7, n.14, n.18, n.24, n.31, n.34. In these moves, the present continuous describes an action that was in progress at the time of publishing the research.

The present perfect is used in the three types of Move 8, particularly in the articles n.4, n.22 and n.35. The present perfect occurs in situations where the research findings are emphasized therefore, it is used to describe the events that happened at some indefinite time in past and influence the present.

2. Direct speech

The lexical verb *say* and the words with similar meaning were identified as the lexical signals of Move 8 in the Bachelor thesis (Stejskalová, 2010). Since their use is related to the reported speech the frequent occurrence of direct quotations was not surprising.

Direct speech occurring in Move 8 primarily functions as a tool for a writer not to take responsibility for the researcher´ s statement. It very often contains experts' comments on the research results concerning their significance in the concrete field of science and their influence on the future works. It can be evident in the following example:

> *"Our observations emphasize a need to further evaluate the biologic mechanisms and approaches of Tai Chi to extend its benefits to a broader population," concluded Dr. Wang*. (n.11)

Direct quotation had been expected as a grammatical feature of Move 8 prior to the analysis. This expectation was confirmed by the results of the analysis.

3. Locative expressions

When analyzing Move 8 it was found out that adverbials of place and also postmodifications by prepositional phrases are used to specify locations. They usually

describe a place of an important finding or a position where a significant change is expected. It can be demonstrated by:

… *Further, our work identifies specific molecular changes in neurons*… (n.4)

Furthermore, postmdifications by prepositional phrases functioning as locative expressions also provide specific information about the person(s) involved in a study being reported. They convey "where" the persons who participated in the study are from, which can be seen in the following example:

… *scientists from the University of California, San Francisco*… (n.18)

4. Short passive structure

The frequent occurrence of the short passive structures is associated with the fact that Move 8 very often informs about the contributions of the research results. The use of the short passive structures helps to focus attention on the act of a discovery considered to be the most important information emerging from a study being reported. It is demonstrated by:

Studies carried out by researchers at UAB can not only be applied to reproductive cloning of animal models; they can also be used for … (n.3)

5. Modal verbs: can, may, could

The frequent occurrence of modal verbs: *can, may* and *could* marking deontic modality (ability) or epistemic modality (possibility) was observed in Move 8. Since the modal verbs usually occur in statements introducing the possible implications of the new finding, the majority of them express epistemic modality. That is realised by:

… if the work of Israelian and colleagues is correct, it may provide an additional method… (n.30)

Moreover, the modal verb *would* expressing the prediction of future action also occur in Move 8, concretely in the articles n. 12, n.14, n.15, n35. In these moves the modal verb *would* is used when describing a prediction of the event coming out of the research finding.

The function of Move 8 is to conclude the most important facts of the research results that are considered to be significant in a concrete field of science. It emphasizes the contributions that the study has made to the field and conveys possible implications

of a recent finding. Furthermore, it very often presents the scientists' comments concerning the research findings.

Grammatical aspects defined in Move 8 are: the simple present tense, direct quotations, locative expressions, short passive structures, the modal verbs marking possibility.

6 Conclusion

In this work, devoted to the topic of grammatical aspects of the moves in popular scientific reports (PSRs), I intended to describe a process of move analysis, to introduce the genre of Science Popularization and its generic structure and to identify grammatical features in each move organizing the overall structure of PSRs.

The first chapter of theoretical part dealt with genre analysis and its background, including three different approaches to genre analysis. Since move analysis was developed as a top–down approach, the explanation of top-down approaches was also involved into this part. The basic concept contained in the following section was focused on move analysis by Swales and its description. A corpus–based approach was also introduced in this section to show differences between a corpus–based approach and move analysis in hand. Moreover, it helped emphasize the main advantages of move analysis in hand since this type of analysis was used for the purpose of the work.

The following part was concerned with Science Popularization. The process of Science Popularization and the audience of popular scientific reports were described to better understand the main function of the PSR genre. Since this study was based on the Nwogu's structure of Science Popularization – to my knowledge his work is the only one dealing with the generic structure of popularized scientific texts - the next part was concerned with Nwogu's structure to underline its significance in this concrete area.

The last section of the theoretical part introduced the modified structure of PSRs used within this study, including theoretical descriptions of all "moves" organizing the structure of PSRs. The lexical signals of each move as well as their expected grammatical features deduced from the purposes of individual moves were presented in this part.

The identification of the generic structure in popular scientific reports and relevant understanding of the purposes of individual moves - smaller parts of a text organizing the information in PSRs – were two essential steps in the analysis of grammatical features. The practical part discussed the occurrence of each grammatical feature concerning its main function within a particular move and its possible association with the concrete lexical signal(s). The results of the analysis are introduced in the following paragraphs.

According to the analysis it is obvious that there are some significant structural and grammatical features by which the genre of popular scientific reports can be identified. Considering the structure, a popular scientific report is made up by eight moves each fulfilling its particular purpose. However, it was found out that the structure of PSRs is not always made up of all these eight moves. For instance, Move 1 and also Move 3 - previous study do not occur very often in popular scientific reports, concretely in the 35 analyzed articles 16 occurrences of Move 1 and only 9 occurrences of Move 3 - previous study were identified. For that reason, they can be marked as optional. On the other hand, some moves, particularly Move 5 and Move 7, are obligatory, as they always occur in PSRs. It was also found out that Move 1 and Move 2 are always presented only once in the structure of a PSR, while other moves can occur several times. It is due to the fact that both moves provide basic information about a research with the main intention to catch the readers´ attention. For that reason, it would be inappropriate to mention them more than just once.

The results also indicate that the organisation of moves in the genre of PSRs is not fixed which is in contrast to Nwogu's structure of Medical popularized texts where Nwogu claims that "there exists hierarchical order for the organization of moves in the texts." (Nwogu cited in Stejskalová, 2010:43).

It must be said that the identification of the structure of popular scientific reports was not the main goal of this work; however, it played a very important role when analyzing grammatical features in individual moves. For that reason, the findings considered to be the most important were introduced above. Further details concerning the structure of popular scientific reports can be found in Bachelor thesis (Stejskalová, 2010).

Considering the grammatical features, the results show that each move contains grammatical features that are influenced by the purpose of individual moves and sometimes by their concrete lexical signals.

According to the analysis, the main purpose of Move 1 is to provide background information about the topic of discourse. It presents knowledge which in the context of the research can be regarded as holding true for a long period of time. Therefore, grammatical features identified in Move 1 are: the present simple and the modal verbs *can, may* marking the logical possibility and ability.

Move 2 announces details about a recent finding of the research being reported, including a possible contribution that the study has made to the field of science. According to its purpose, grammatical features identified in Move 2 are: the simple present tense, the present perfect, indefinite articles, adverbials of place and that-clauses in post-predicate positions. The frequent occurrence of that-clauses in post-predicate positions is closely linked with Move 2´ s lexical signal *find* since this verb belongs to the group of verbs common taking that-clauses in post-predicate positions.

Move 3 - larger context provides general information about a studied entity to a non-specialist audience and it helps readers better understand the importance of the study. According to its purpose, grammatical features defined in Move 3 - larger context are: the simple present tense, adverbials of place, passive structures and the condensed passive.

Move 3 - limitation informs about the facts that are somehow limited or unknown in ongoing research or about the facts that were unclear and complicated in the previous research. Considering its purpose, the grammatical features in Move 3 - limitation are: the simple present tense, verbal and non-verbal negation, contrastive conjunctions, adverbials of place and the modal verbs *can, could,* and *may,* marking logical possibility and ability.

The main purpose of Move 3 - previous study is to provide details about the previous studies that are related to the study being reported. Therefore, the grammatical features defined in Move 3 - previous study are: that – clauses, the simple present tense, the past simple tense, the present perfect and the modal verb *would* expressing predictions of future action. The frequent occurrence of that – clauses in Move 3 - previous study is associated with its defined lexical signals *find* and *show*. Similarly, as it was written in Move 2 when commenting the occurrence of that – clauses, these verbs are common in taking that-clauses in post-predicate positions.

The main function of Move 4 is to introduce new research and to explain its aim and purpose. Move 4 very often presents only one piece of information conveying the publication of research results. Grammatical features defined according to the purpose of Move 4 are: adverbials of place, short passive constructions and the simple present tense.

Move 5 is the first move that introduces the outcomes obtained from the procedures of data collection and that presents their possible implications in detail. Considering the purpose of Move 5, its grammatical features are the following: the simple present tense, the past simple tense, relative clauses, passive structures and the condensed passive, that-clauses, adverbials of place and contrastive conjunctions. The occurrence of that-clauses in Move 5 is influenced by its defined lexical signals, concretely by the lexical verbs *find, know* and *think,* as they belong to the group of verbs common in taking that – clauses in post-predicate positions.

Move 6 describes the data collection realized in a concrete time in the past, and explains methods used in the research being reported. Therefore, the grammatical features identified in Move 6 are: the past simple; passive structures and the condensed passive; finite and non-finite relative clauses; locative expressions represented by adverbials of place and postmodification by prepositional phrases; and infinitives of purpose. Since the relative clauses in Move 6 very often postmodify the nouns referring to participants involved in a study and researchers carrying out the study, their frequent occurrence is associated with the lexical signals *participant* and *researcher,* defined in Move 6.

The purpose of Move 7 is to indicate the main research outcomes and to provide their description and explanation in a celebratory or deductive way. Moreover, it can convey researchers´ propositions concerning a particular research finding. Considering the purpose of Move 7, its grammatical features are: the simple present tense; the simple past tense; locative expressions; that-clauses; relative clauses (finite and non-finite), passive structures and the condensed passive; direct quotations; contrastive conjunctions. When analysing Move 7 it was found out that three grammatical features are closely linked with the lexical signals identified in Move 7. The occurrence of that-clauses is associated with the lexical signal *find* and the lexical signal *say*, both notably common in taking that-clauses in post-predicate positions. Relative-clauses realized by the relativizer *who* are connected with the lexical signal *researcher* and direct quotation is associated with the lexical signal *say* whose function is primarily to introduce reported speech.

The last move, Move 8 concludes the most important facts of research results, regarding their significance in a concrete field of science. It also presents scientists´

comments on research findings and their possible implications. According to its purpose, grammatical features defined in Move 8 are: the simple present tense; direct quotations; locative expressions; short passive structures; modal verbs marking possibility and ability. The use of direct quotation is influenced by the same factor as it was described in Move 7.

From the results presented above it is evident that some grammatical aspects, namely the simple present tense; locative expressions; passive structures and the condensed passive; that-clauses; relative clauses; and the past simple were identified as grammatical features in more than two moves. It was observed that the simple present tense was defined as a grammatical feature in all moves except Move 6. Move 6 mainly informs about steps of research procedures and processes of data collection that happened in a concrete time in the past. Therefore, the simple present tense was not identified as grammatical feature in Move 6, but past the simple tense was.

In general, the simple present tense used in PSRs supports the idea that scientists´ propositions concerning the research findings are true, regardless of time; and it allows that the research results can be read at any time from the perspective of their present. Furthermore, the use of the simple present tense helps to make descriptions and explanations clearer to a non-specialist audience.

Passive structures and the condensed passive are considered as a grammatical feature in six moves, particularly in Move 3 - larger context, Move 4, Move 5, Move 6, Move 7 and Move 8. From the results of the analysis it is obvious that passive structures occurring in the genre of PSRs are usually in the form of short passive to avoid mentioning the initiator of an action and to focus attention on the important research events. In addition, the use of passive structures supports a more objective view from what is being described. The frequent occurrence of the condensed passive, taking the past participial verb form, is primarily influenced by a journalistic desire to save space and also by the frequent use of non-finite relative clauses, concretely participial ed-clauses.

Locative expressions were identified as a grammatical feature in seven moves, in Move 2, Move 3 - larger context, Move 4, Move 5, Move 6, Move 7 and Move 8. All these moves convey further details about the research being reported and provide more specific information about a concrete item. On the basis of the analysis it was found out

that locative expressions occurring in PSRs are realized by two forms: adverbials of place and postmodification by prepositional phrases. Both forms of locative expressions are used to specify a particular location of a concrete item.

That-clauses in post predicate positions were marked as a grammatical feature in Move 2, Move 3 - previous study, Move 5 and in Move 7. The results show that the use of that-clauses is always associated with a concrete lexical verb defined as a lexical signal of a particular move. All these moves contain lexical signals referring to lexical verbs that belong to the group of verbs commonly taking that–clauses in post-predicate positions.

Finite and non-finite relative clauses were defined as a grammatical feature in three moves, particularly in Move 5, Move 6 and Move 7. Based on the analysis, finite relative clauses occurring in PSRs are formed by the following relativizers: *that*, *which* and *who*; non-finite relative clauses occurring in PSRs are realized by participle clauses such as ing–clauses and ed-clauses. It has already been written that the use of non-finite ed-clauses is closely linked with the frequent occurrence of condensed passive constructions formed by the past participle verb form. Therefore, the use of participle ed-clauses supports the journalistic desire to save space. The common occurrence of relative clauses is also influenced by the type of sentences used in these individual moves. Since all these particular moves provide descriptions and explanations concerning the research being reported, complex sentences rather than simple sentences are mainly used. Moreover, the use of relative clauses in Move 6 and Move 7 is also associated with their defined lexical signals, concretely with the lexical signals *researcher* and *participant*, as they are usually postmodified by finite or non-finite relative clauses. The occurrence of relative clauses in Move 5 is not influenced by Move´ s 5 lexical signals, since they very often postmodify a noun referring to a studied entity. Among these nouns there was not found any type of relation such as synonymy or hyponymy. For that reason, lexical signals referring a studied entity were not defined in Move 5.

The past simple was determined as a grammatical feature in three moves, namely in Move 3 - previous study, Move 5 and Move 6. The use of the simple past tense is influenced by the context of moves since they all describe the research events that happened in a concrete time in past.

The frequent occurrence of the modal verbs *can, could* and *may* was identified as a grammatical feature in Move 1, Move 3 – limitation and in Move 8. Modal verbs occurring in Move 1 and Move 3 – limitation are used to mark either possibility (epistemic modality) or ability (deontic modality). The reason for expressing both modalities is influenced by the fact that both moves provide background information. Therefore, their contents are not as concrete as they are in Move 8. In Move 8 majority of modal verbs express possibility (epistemic modality) since they usually occur in statements introducing the possible implications of a new finding.

On the basis of the results, the present perfect tense is typical of two moves, concretely Move 2 and Move 3 – previous study; however, in each move fulfils a different function. Move 2 mainly introduces a recent scientific finding. Therefore, the function of present perfect in Move 2 is to express a resent past. The present perfect occurring in Move 3 - previous study describes the continuing validity of earlier findings, which is termed as a continuative perfect type of present perfect.

Results also indicate that concrete grammatical features occur only in one move. Therefore, it can be said that these particular moves convey a kind of "uniqueness" which is typical only to them. Indefinite articles are defined as a grammatical feature in Move 2. It indicates the singularity of a recent finding or a singularity of a study being reported. Within Move 2 both items are usually mentioned for the first time, which is the next factor influencing the use of indefinite article primarily in Move 2. The frequent occurrence of infinitive of purpose was identified in Move 6. Move 6 usually tries to describe processes of data collection to the potential audience. As the audience of PSRs is non-specialist, the explanation of "why" a particular process was realized is needed to support the readers' understanding of the research. Negation is the next grammatical feature defined in one particular move, in Move 3 – limitation. Move 3 - limitation is the only move whose main purpose is to inform the readers about the limitations of an ongoing study or previous research. Therefore, the occurrence of verbal and non-verbal negation was identified as a grammatical feature in Move 3 – limitation only. The modal verb *would* marking epistemic modality is the last grammatical feature identified in one particular move, namely in Move 3 – previous research. Move 3 – previous research very often introduces the scientist's expectations

of research results. For that reason, the main function of the modal verb *would* in Move 3 – previous study is to express predictions of future action.

According to the purposes of individual moves and also according to their identified lexical signals, some grammatical features had been expected prior to the analysis. The results show that almost all grammatical features were confirmed; however, three expected grammatical features were not confirmed by the results, concretely direct quotation expected in Move 3 - larger context; adverbials of time suggested in Move 3 - limitation and the model verb *will* marking the future time assumed in Move 8.

The frequent occurrence of direct speech had been expected due to the defined lexical signal *say,* whose main function is to introduce reported speech. However, the overall number of direct quotations did not meet the established condition for identifying it as a grammatical feature, which is influenced by the fact that Move 3-larger context primarily provides general information about a studied entity to a non-specialist audience and that its function is mainly educative. Move 3 - limitation introduces the events that were limited by any type of negative factor. Therefore, the frequent occurrence of time adverbials specifying "when" that concrete limitation happened had been expected before. During the analysis it was found out that Move 3-limitation describes a particular item and very often uses adverbials of place to specify its location. Since Move 8 states future implications of the research results, the use of modal verb *will* signalling future time had been assumed before. However, the findings show that Move 8 rather than stating the future implications as future facts – which supported the use of *will* - it presents them in a form of future possibilities.

To sum up all these findings it can be concluded that the genre of popular scientific reports has its typical structure which is made up by eight moves, each fulfilling a particular purpose and each having its characteristic grammatical features. The occurrence of grammatical features is always influenced by the purposes of individual moves and also by the concrete lexical signals defined in a particular move. On the basis of the results, grammatical features such as the simple present tense; locative expressions; passive structures and the condensed passive; that-clauses; relative clauses; modal verbs marking logical possibility or ability and the past simple tense are common for at least three moves. This finding meets the established condition that the

defined grammatical feature has to occur in one-third of identified moves – the structure of PSRs is made up of eight moves. Furthermore, it was observed that the functions of these concrete grammatical features occurring in different types of moves are almost the same. For that reason, they can be considered as grammatical features of the genre of popular scientific reports. On the other hand, some moves, concretely Move 2, Move 3 – previous study and Move 3 - limitation convey a kind of "uniqueness" since each of them contains grammatical features that do not occur in other moves.

I believe that this work concerning the grammatical features in the generic structure of popular scientific reports brings interesting findings to the genre of Science Popularization and that it will be a contribution for future studies concerning the genre of Science Popularization.

7 Resumé

Je zřejmé, že v dnešní moderní době hraje věda velmi významnou a viditelnou roli, neboť dokáže ovlivnit šíření politických idejí a pochopitelně i kvalitu lidského života. Lidé se zajímají o nedávné vědecké nálezy a objevy, ale jelikož nejsou v oboru vědy specialisty, potřebují, aby tyto vědecké novinky byly prezentovány speciálním, pro ně srozumitelným způsobem. Z tohoto důvodu zde existuje určitá vzájemná interakce mezi vědeckým světem a světem medií.

Hlavním cílem této diplomové práce je určit gramatické aspekty v žánrové struktuře populárně naučných zpráv, konkrétně v jejich textových vzorcích. Teoretická část postupuje od všeobecnějších témat k více konkrétním a je postavena na základě dostupné literatury. První kapitola teoretické části se zabývá žánrovou analýzou a uvádí zde tři různé pohledy založené na studiích, jež se zabývají problematikou žánru. Jde o studie žánru z hlediska rétoriky, funkčnosti žánru, a studii z hlediska použití anglického jazyka s určitým cílem. Poslední studii, tedy studii z hlediska použití anglického jazyka s určitým cílem, byla věnovaná větší pozornost, jelikož tento přístup byl použit k popularizaci textů, a to zdravotních a lékařských. V této části je také popsán tzv. „top-down“ přístup k analýze diskurzu, neboť tento přístup je úzce spjat s analýzou textových vzorků, odborně pojmenovanou „move analysis“, která je jeho reprezentantem. V následující části této kapitoly je představena analýza textových vzorků, kterou vytvořil Swales a jsou zde popsány jednotlivé kroky, doporučené při její realizaci. Tzv. corpus – based přístup, v angl. terminologii corpus – based approach, je zde také zmíněn s cílem, ukázat patrné rozdíly mezí tímto přístupem k analýze diskurzu a analýzou jednotlivých textových vzorků, která byla použita pro účel této práce.

Druhá polovina teoretické části je zaměřena především na populárně naučný žánr. Vysvětluje se zde proces popularizace naučných textů, což napomáhá lépe pochopit jeho funkci a funkci populárně vědeckého žánru celkově. Uvádí zde definici populárně vědeckých zpráv, která podtrhává tu skutečnost, že populárně vědecké zprávy nejsou brány jako žánr sociální interakce, ale jako žánr, jehož hlavním cílem je předání určité informace. V populárně vědeckých zprávách jde především o informace týkající se nedávného vědeckého objevu. Jako velice zajímavá a pro populárně naučný žánr i přínosná se zdá být myšlenka Martina, který tvrdí, že mezi jednotlivými žánry existuje určitý vztah. Z tohoto důvodu je zde jeho teorie demonstrována a vztažena k populárně

vědeckým pracím. Typ obecenstva je považován za podstatný faktor, který vždy významně ovlivňuje způsob, jakým je informace prezentována. Následující podkapitola se tomuto významnému faktoru věnuje a konkretizuje zde typ obecenstva populárně vědeckých zpráv. Další kapitola teoretické části je zaměřena především na strukturu populárně vědeckých prací. Jelikož tato studie vychází ze studie Nwogy, jehož práce, pokud vím, je jediná, která se zabývá problematikou populárně vědeckých zpráv, jeho studie a výsledky z ní získané jsou zde prezentvány. Nwogu ve své práci tvrdí, že populárně vědecké zprávy mají určitou strukturu. Avšak tato struktura, dle jeho názoru, není pevná a její obměny jsou možné. Struktura, použitá pro účely této práce, je představena v poslední kapitole teoretické části. Každá „move“ , neboli textový vzorek tvořící strukturu populárně naučných zpráv je zde detailně popsán a u každé „move“ jsou uvedeny její lexikální signály a její předpokládané gramatické úkazy. Tyto gramatické úkazy byly vždy odvozeny z účelů jednotlivých moves, v některých případech i z lexikálních signálů konkrétního textového vzorku.

Praktická část této diplomové práce je zaměřena na analýzu textů populárně vědeckých zpráv s cílem identifikovat gramatické aspekty v každém textovém vzorku, odborně nazvaném "move". V této práci se jako gramatický aspekt chápe gramatický prvek, který se v dané "move" vyskytuje často a vzhledem k ní plní určitý účel. Z tohoto důvodu je samotná analýza podřízena dvěma nezbytným krokům. Prvním krokem je určení celkové struktury - organizace textových vzorků - populárně vědeckých zpráv. Druhým a velice podstatným krokem k možné analýze gramatických jevů je definování účelů všech textových vzorků, které organizují text populárně vědeckých zpráv. Po realizování těchto dvou postupů je možné začít s analýzou populárně vědeckých zpráv v rámci identifikace gramatických aspektů v každé "move" a následně hledat určité spojitosti mezi gramatickými prvky a lexikálními signály jednotlivých textových vzorků.

Analýza gramatických aspektů vyskytujících se v jednotlivých textových vzorcích populárně naučné struktury, jež je vytyčená jako hlavní úkol této práce, zahrnuje zkoumání 35 populárně vědeckých zpráv, náhodně nalezených na internetu. Pro identifikování gramatických aspektů v jednotlivých textových vzorcích je stanovena následující podmínka: gramatický prvek se musí vyskytovat v jedné třetině z

celkového počtu identifikovaných „moves“ určitého typu. Pokud byla tato podmínka splněna, gramatický aspekt je považován za gramatický prvek dané „move“.
Pro každou analyzovanou "move" byla vytvořena detailní tabulka uvádějící tři základními údaje: číslo článku, konkrétní gramatický prvek a jeho výskyt v dané „move“. Pod každou tabulkou jsou dále pak uvedeny tři podstatné informace a to: celkový počet „moves“ identifikovaných mezi 35 články, číslo označující jejich jednu třetinu z celkového počtu a počet výskytu konkrétního gramatického prvku v rámci dané „move“.

Poslední kapitola praktické části informuje o výsledcích, získaných z analýzy. Během analyzování korpusu (popsán v předchozím odstavci) bylo zjištěno, že struktura populárně naučných zpráv je tvořena osmi textovými vzorky tzv.„moves“ , při čemž každá „move“ plní ve struktuře populárně vědeckých zpráv svůj určitý účel. Dále bylo zjištěno, že ne vždy je text populárně vědeckých zpráv organizován všemi osmi "moves". Konkrétně Move 1 a Move 3 - previous study se ne vždy vyskytují v populárně vědeckých článcích a proto mohou být označeny za nepovinné. Na druhou stranu, některé textové vzorky, zejména Move 5 a Move 7 se ve struktuře populárně naučného žánru objevují vždy, a proto mohou být označeny za povinné. Další zajímavý poznatek týkající se textových vzorků struktury je následující; Move 1 a Move 2 se ve struktuře objevují pouze jednou, zatímco ostatní „moves“ se mohou objevit i několikrát. Tato skutečnost může být vysvětlena tím, že Move 1 i Move 2 poskytují čtenáři pouze základní informace o dané studuji či objevu, s hlavním úmyslem upoutat čtenářovu pozornost. Tudíž, jejich opakovaný výskyt by byl nevhodný až nelogický.

Výsledky analýzy týkající se gramatických jevů v jejich jednotlivých textových vzorcích ukazují, že každý textový vzorek tzv. „move“ obsahuje gramatický aspekt jemu charakteristický. Častý výskyt gramatického aspektu je vždy ovlivněn účelem „move“; v některým případech je také úzce spojen s konkrétním lexikálním signálem dané „move“.

Některé gramatické aspekty byly předpokládané ještě před samotnou realizací analýzy podle účelu jednotlivých moves a podle jejich lexikálních signálů. Výsledky analýzy téměř všechny tyto očekávané gramatické aspekty potvrdily, avšak výskyt tří očekávaných gramatických aspektů nebyl na základě získaných výsledků potvrzen. Konkrétně se jedná o očekávaný častý výskyt přímé řeči v Move 3 - larger kontext;

příslovečné určení času v Move 3 – limitation ; a časté použití modálního slovesa *will* označující budoucí čas v Move 8.

Z výsledků analýzy je patrné, že gramatické prky jako jsou: přítomný čas prostý, vyjádření používána k určení pozice, trpný rod a zestručněné pasivum, vedlejší věty obsahové předmětné, substantivní vztažné věty vedlejší, modální slovesa označující možnost (modalita jistotní) a dovednost (modalita dispoziční) a minulý čas prostý jsou časté pro alespoň tři textové vzorky. Splňují tak stanovenou podmínku pro identifikaci gramatického aspektu – struktura populárně naučných zpráv je tvořena osmi „moves". Ačkoliv se tyto gramatické aspekty vyskytují v různých typech „moves" , které mají tedy i různý účel ve struktuře textu populárně naučných zpráv, jejich hlavní účel v jednotlivých moves je vždy téměř stejný. Na základě tohoto zjištění je možné dojít k závěru, že výše uvedené gramatické aspekty jsou charakteristické pro žánr populárně vědeckých zpráv. Naproti tomu, některé textové prvky, konkrétně Move 2, Move 3 – previous research and Move 3 – limitation, vyjadřují určitý druh „jedinečnosti", neboť každý z nich obsahuje gramatický aspekt, který se nevyskytuje v žádném jiném textovém vzorku. Je tedy typický jen pro tu jednu konkrétní „move".

Jelikož žánru populárně vědeckých zpráv nebyla dosud věnována dostatečná pozornost, věřím, že tato diplomová práce, zaměřená na gramatické aspekty v žánrové struktuře populárně naučných zpráv, konkrétně v jejich jednotlivých textových vzorcích, přinese zajímavé poznatky v oblasti popularizace naučných zpráv, a že bude přínosem i pro budoucí práce věnující se tomuto žánru.

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9 Appendices

Appendix number 1: Tables of Analyses of Moves

Appendix number 2: Data Sources

Appendix n.1: Tables of the Analyses of Moves

Move 1 The occurence of grammatical features

Table 1: Present simple tense; **modal verbs marking posibility and ability**

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1	no Move 1		19	**may get**	1 / **1**
2	no Move 1		20	is, *have mastered*	1 / **0**
3	no Move 1		21	*felt,* aren´t, *were*	1 / **0**
4	no Move 1		22	no Move 1	
5	no Move 1		23	no Move 1	
6	*has been credited, became*	0 / 0	24	no Move 1	
7	no Move 1		25	no Move 1	
8	do you speak…, have	1 / 0	26	have, seems, is known	1 / **0**
9	**may** be , talk, is	1 / **1**	27	no Move 1	
10	**can think**, apply, send	1 / **1**	28	is not	1 / **0**
11	no Move 1		29	no Move 1	0
12	is, help	1 / **0**	30	no Move 1	0
13	no Move 1		31	no Move 1	0
14	no Move 1		32	accounts	1
15	does	1 / **0**	33	*have been told,* **can produce**, *has been*	1 / **1**
16	*wasn´t, went to*	0 / 0	34	no Move 1	
17	*has been getting*, **may be**	1 / **1**	35	no Move 1	
18	no Move 1				

the overall numer of Move 1: 15 **1/3 = 5**

present simple – 13x = grammatical feature modal verbs: 5x = grammatical feature

Table 1.1: Defined grammatical features in Move 1

Grammatical feature	Number of occurrences
Present simple tense	13x
modal verbs: can; may	5x

The occurrence of grammatical features: Move 2

Table 2: indefinit article – a/an

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1	a 4-foot-tall female	1	19	a new roden study	1
2		0	20	a new study, a tip	1
3		0	21	a new study	1
4	a research, a molecular pathway	1	22	a new study	1
5		0	23		0
6		0	24	a treatment, a structured training program	1
7	an million-year-old fossil, a key piece	1	25	a precursor	1
8	no Move 2		26	a new study	1

9	no Move 2		27	a team	1
10		0	28	a pleasant surprise, a new pigment	1
11		0	29	a chocolate bar	1
12	a new study	1	30	a link	1
13	an Australian paleont., a new species	1	31	a risk	1
14	a single enzyme	1	32		0
15	a possible treatment	1	33	a division	1
16	a team	1	34	a series of shots, a new study	1
17		0	35	a protein	1
18	a new study	1			

the overall number: 33 moves **1/3 = 11**
indef. article: 24x = grammatical feature

Table 2.1: simple present tense; **present perfect**

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1	*Was, walked*, offers, may have evolved	1 / **0**	19	shows, destabilize	1 / 0
2	**have found**, has, *could develop*	1 / **1**	20	offers	1 / 0
3	are, **have cloned**, are	1 / **1**	21	suggests, differs, offers, cope with	1 / 0
4	has found, is	1 / **1**	22	are, claims	1 / 0
5	Have, may be, **have found**	1 / **1**	23	**have discovered**, experience, are	1 / 1
6	**has been mounting**, *were*	0 / **1**	24	can occur, can be reduced, includes	1 / 0
7	*uncovered, could be*	0 / **0**	25	**have discovered**, may play	1 / 1
8	no Move 2		26	*used*, supports	1 / 0
9	no Move 2		27	**has developed**	0 / 1
10	have traced	0 / **1**	28	*Was, created*	0 / 0
11	have determined	0 / **1**	29	Go, grab, is, can reduce	1 / 0
12	produce	1 / 0	30	believe, **have found**, have	1 / 1
13	**has unearthed**, **has promted**	0 / **1**	31	*found*, have, *smoked*	1 / 0
14	prevents, enables	**1** / **0**	32	**has proven**, can increase	1 / 1
15	find, struggle, hints	1 / **0**	33	is, produces, *decided*	1 / 0
16	believe, know	1 / **0**	34	Can knock, finds	1 / 0
17	**have made**, are reporting	1 / **1**	35	*Tested, worked*	0 / 0
18	hear	1 / **0**			

the overall number: 33 moves **1/3 = 11**
simple present: 27x = grammatical feature
present perfect: 14x = grammatical feature

Table 2.2: that-clause

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1			19	Shows that newborn	1
2	adding theory that…	1	20		0
3		0	21		0
4		0	22		

5		0	23	has discovered that adolescents…	1
6	has been mounting that other groups	1	24		
7		0	25	has discovered that a precursor …	1
8	No Move 2		26		
9	No Move 2		27		
10			28		
11	have determined that patients …	1	29	is in that eating dark chocolate	1
12	finds that, in the first few days	1	30	believe (that) they´ ve found	1
13			31	found that people	1
14			32		
15			33		
16	a team believe (that) they …	1	34		
17	are reporting that they´ ve made …	1	35	the researchers said the therapy …	1
18					

the overall number: 33 moves **1/3 = 11**
that – clause: 13x – grammatical feature

Table 2.3: locative expressions : posmodification by PP, adverbia of place (AP)

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1			19	in the hippocampus	1
2	outside our solar system	1AP	20		0
3	at the department of cell Biology; In Spain	1 postm. 1 AP	21		0
4	at the univ. of Pensylvania; in the brain	1postm. 1 AP	22	in Enviromental Health Perspectives	1 postm.
5		0	23	from the Univers. de Montreal…	1 postm.
6	in the area	1 AP	24	in children with autism	1 AP
7	in the Gobi desert	1 AP	25	at the Univ.of Lleida; in Alzheimer´ s disease	1 postm. 1 AP
8	no Move 2		26	in children with FASD	1 AP
9	no Move 2		27	at the Univers. of California	1 AP
10		0	28	at Oregon State University	1 postm.
11	from Tufts Univ. school of Medicine	1 postm.	29		0
12		0	30	in Spain; in Sun-like stars	1 AP
13		0	31		0
14	in the USA	1 AP	32	on the joints of the leg	1 AP
15		0	33	at Mercian Corp.	1 postm.

				in Fijisawa	1 AP
16	at the Chinese Academy…	1 postm.	34	in women infected …	1
17		0	35		0
18		0			

the overall number: 33 moves **1/3 = 11**
adverbial of place: 18x = grammatical feature

Table 2.4: Defined grammatical features in Move 2

Grammatical feature	Number of occurrences
Present simple	27x
Indef. article	24x
Locative expression	18 x
Adverbial of place	18x
Present perfect	14x
That - clause	13x

The occurrence of grammatical features: Move 3 - larger context

Table 3: simple present tense

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1 2x	1. move: *are still trying*, split 2. move: *was*, is believed, is	1	19	*have known,* form, are transferred	 1
2	no Move 3 l.c.		20	got, *went to*, *had* says	 1
3	is; is found	1	21	no Move l.c.	
4	no Move 3 l.c.		22	no Move l.c.	
5	is; affects; is characterized by	1	23	no Move l.c.	
6	*was founded by*,sits *made,was,*	1	24	no Move l.c.	
7 4x	1. move: *was found* 2. move: is 3. move: is; includes 4. move: gives; envolve	0 1 1 1	25	is, affects	1
8	no Move 3 l.c.		26 2x	1. move: have 2. move: are; is referred to, occurs, relies, allows	1 1
9	no Move 3 l.c.		27	get, have, fails, turns	1
10	*looked at,* is called*, was discovered,*	1	28	no Move 3 l.c.	
11	is, results, are, causes	1	29	no Move 3 l.c.	
12	is born	1	30	no Move 3 l.c.	
13	have, are, says, *were*	1	31	is; interferes; use; lowers, makes, is eaten, cannot use, is, can lead	1
14 2x	1. move: belongs, causes, can survive 2. move: occurs; is; can result	1 1	32	no Move 3 l.c.	
15	have, helps, are	1	33	contains; are harvested; tends	1
16	had, were	0	34	is	1

17	no move 3 l.c.		35 2x	1. move continue, die 2. move is known	1 1
18	no move 3 l.c.				

the overall number of moves 27 **1/3 = 9**

present simple 24x = grammatcal feature

Table 3.1: passive structures and the **condensed passive**

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1 2x	1. move: 2. move: nicknamed; was studied by; is believed	0 / **0** 1 / **1**	19	are transferred	1 / **0**
2	no Move 3 l.c.		20		0 / **0**
3	located, Valproic acid is found	1 / **1**	21	no Move l.c.	
4	no Move 3 l.c.		22	no Move l.c.	
5	is characterized by	1 / **0**	23	no Move l.c.	
6	was founded by	1 / **0**	24	no Move 3 l.c.	
7 4x	1. move was found, was named 2. move: known 3. move: would be covered 4. move:	1 / **0** 0 / **0** 1 / **0** 1 / **0** 0 / **0**	25		0 / **0**
8	no Move 3 l.c.		26 2x	1. move: 2. move: is referred	0 1 / **0**
9	no Move 3 l.c.		27	referred	0 / **1**
10	is called; located; was discovered by; be involved	1 / **1**	28	no Move 3 l.c.	
11		0	29	no Move 3 l.c.	
12	is born	1 / **0**	30	no Move 3 l.c.	
13		0 / **0**	31	produced by	0 / **1**
14 2x	1. move: called; known 2. move:	0 / **1** 0 / **0**	32	no Move 3 l.c.	
15	called; are focused	1 / **1**	33	were grown, are harvested	1 / **0**
16		0 / **0**	34		0 / **0**
17	no move 3 l.c.		35	is known	1 / **0**
18	no move 3 l.c.				

the overall number of moves 27 **1/3 = 9**

passive construction: 21x = grammativa feature (cond. passive 7x; passive 14x)

Table 3.2: locative expressions: adverbial of place (AP), postmodifications by PP(Postm.)

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1 2x	1. move: from their common… 2. move: in what is now Ethiopia	1 AP 1 AP	19	in the hippocampus; in other parts of the brain	1 AP
2	no Move 3 l.c.		20	from the Dutch subtitles	1 Postm.
3	at the cell nucleus	1 AP	21	no Move l.c.	
4	no Move 3 l.c.		22	no Move l.c.	
5		0	23	no Move l.c.	
6	on the Mediterranean…	1 AP	24	no Move l.c.	

7 4x	1. move: in the southern part 2. move: 3. move: in the 1993 movie… 4. move: in the environment	1 AP 0 1 AP 1 Postm.	25		0
8	no Move 3 l.c.		26 2x	1. move: in the department 2. move: in these areas; in the two hemispheres	1 Postm. 1 AP
9	no Move 3 l.c.		27		0
10	in the cerebral cortex	1 AP	28	no Move 3 l.c.	
11		0	29	no Move 3 l.c.	
12		0	30	no Move 3 l.c.	
13		0	31	in type 2 diabetes	1 AP
14 2x	1. move: in controlling gene… 2. move in injured nerve …	1 Postm. 1 AP	32	no Move 3 l.c.	
15	in fallen leaves	1	33	in the soil	1 Postm.
16		0	34		0
17	no move 3 l.c.		35		0
18	no move 3 l.c.				

the overall number of moves 27 **1/3 = 9**

adverbial of place 17x

Table 3.3: Grammatical features defined in Move 3 larger context

Grammatical feature	Number of occurrences
Present simple	24
Adverbial of place	17
Passive structure + condensed passive	13

The occurrence of grammatical features: Move 3 – limitation

Table 4: present simple; **modal verbs marking posibility and ability**

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1	no Move 3 limitation		19 ongo	*have debated*	0 / 0
2	no Move 3 limitation		20	no Move 3 limitation	
3 ongo	must wait	1 / **0**	21	no Move 3 limitation	
4 1.ongo 2.ongo	1. move **can have**, affects, 2. move *have remained* is known, **can have** , affects, remain	 1 / **1** 1 / **1**	22	no Move 3 limitation	
5 ongo	may improve, are, **can slow down** , halt	1 / **1**	23 past	*found, was influenced by, was not*	0 / **0**
6 ongo	isn´ t	1 / **0**	24 past	*showed*, *reduced*, *returned, was discontinued*	0 / **0**
7 ongo	disagree, don´ t know, is	1 / **0**	25	no Move 3 limitation	

8 ongo	did not allow	0 / **0**	26	no Move 3 limitation	
9	no Move 3 limitation		27	no Move 3 limitation	
10 ongo	is, *have been*_, happen, *has been*	1 / **0**	28	no Move 3 limitation	
11	no Move 3 limitation		29	no Move 3 limitation	
12 1.past 2.ongo	1. move: didn´t believe, **could make** 2.move: thinks, learn, is, *are showing*	1 / **1** 1 / **0**	30 1.ongo 2.ongo	1. move: has, is, *have been unable*, isn´t, does not extend 2. move: remains, believes, don´t understand, is influenced by, is concerned by, **could have .,** *haven´t been detected yet*	1 / 0 1 / **1**
13	no Move 3 limitation		31 ongo	have, is	1 / **0**
14 ongo	notes, *have failed*	1 / **0**	32	no Move 3 limitation	
15	no Move 3 limitation		33 ongo	is not, **can taste, can ruin**	1 / **1**
16	no Move 3 limitation		34 1.ongo 2.ongo 3.ongo	1. move: **can be removed**, recur, says 2. move: failed, remains, had, had been fighting 3. move remains, **may have**	1 / **1** 1 / **0** 1 / **1**
17 past	*had been exploring*, *didn´t connect*, wondered, **could serve**	1 / **1**	35 1.ongo 2.ongo	1. move: are used, have 2. move: it´s not, have, delay	1 / **0** 1 / **0**
18	no Move 3 limitation				

overall number: 25 moves **1/3=8**

Move 3-limitation past 4x
Move 3-limitation ongoing 21x

present simple:18x – grammatical feature
modal verbs: 9x - grammatical feature

Table 4.1: locative expressions: adverbial of place (AP), postmodifications by PP (Postm.)

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1	no Move 3 limitation		19 ongo	in learning and memory	1 AP
2	no Move 3 limitation		20	no Move 3 limitation	
3 ongo		0	21	no Move 3 limitation	
4 1.ongo 2.ongo	1. move: 2. move:	0 0	22	no Move 3 limitation	
5 ongo		0	23 past	in adults	1 postm.
6 ongo		0	24 past	From a 2002 RUPP	1 postm.
7 ongo		0	25	no Move 3 limitation	
8 ongo		0	26	no Move 3 limitation	
9	no Move 3 limitation		27	no Move 3 limitation	
10 ongo			28	no Move 3 limitation	
11	no Move 3 limitation		29	no Move 3 limitation	
12 1.past 2. ongo	1. move: 2. move: in utero	1 AP	30 1. ongo 2. ongo	1. move: in to the interior 2.move: in the study	1AP 1 AP
13	no Move 3 limitation		31 ongo		0
14 ongo	from the laboratory to the clinic	1 AP	32	no Move 3 limitation	

15	no Move 3 limitation		33 ongo		
16	no Move 3 limitation		34 1.ongo 2.ongo 3.ongo	1. move: at VU Univ. Amster. 2. move: 3. move:	 1 postm
17 past	at Stanford Univ., on top	1 postm.	35 1.ongo 2.ongo	1. move: 2. move:	 0 0
18	no Move 3- limitation				

overall number: 25 moves **1/3=8**

Locative expressions 9x – grammatical feature

Table 4.2: verbal, **non-verbal negation**

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1	no Move 3 limitation		19 ongo		0 / **0**
2	no Move 3 limitation		20	no Move 3 limitation	
3 ongo		0	21	no Move 3 limitation	
4 1.ongo 2.ongo	1. move: unknown 2. move unknown	0 / **1** 0 / **1**	22	no Move 3 limitation	
5 ongo			23 past	was not clear	1 / **0**
6 ongo	isn´t known	1 / **0**	24 past	was discontinued	0 / **1**
7 ongo	disagree, don´t know	1 / **1**	25	no Move 3 limitation	
8 ongo	did not allow	1 / **0**	26	no Move 3 limitation	
9	no Move 3 limitation		27	no Move 3 limitation	
10 ongo	unable	0 / **1**	28	no Move 3 limitation	
11	no Move 3 limitation		29	no Move 3 limitation	
12 1.past 2.ongo	1. move: didn´t believe 2.move: impossible	1 / **0** 0 / **1**	30 1.ongo 2.ongo	1. move: unable, isn´t, does not extend 2. move: don´t understand, no haven´t been detected	1 / **1** 1 / **0**
13	no Move 3 limitation		31 ongo	unclear	0 / **1**
14 ongo		0	32	no Move 3 limitation	
15	no Move 3 limitation		33 ongo	is not hard	1 / **0**
16	no Move 3 limitation		34 1.ongo 2.ongo 3.ongo	1. move: 2. move: unclear 3. move: unclear	0 / **0** 0 / **1** 0 / **1**
17 past	didn´t connect	1	35 1.ongo 2.ongo	1. move 2. move it´s not possible, not enough	0 / **0** 0 / **0** 1 / **0**
18	no Move 3 limitation				

overall number: 25 moves **1/3=8**

verbal, non-verbal negation 19 x = grammatical featuter (verbal:10x; non-verbal: 9x)

Table 4.3: Contrastive comjunctions

article	Grammat. feature	occurence	article	Grammat. feature	occurence
1	no Move 3 limitation		19 ongo		0
2	no Move 3 limitation		20	no Move 3 limitation	
3 ongo	however	1	21	no Move 3 limitation	
4 1.ongo	1. move: but		22	no Move 3 limitation	

2.ongo	2. move: but	1 1			
5 ongo	although	1	23 past	although	1
6 ongo		0	24 past	however	1
7 ongo	but	1	25	no Move 3 limitation	
8 ongo	however	1	26	no Move 3 limitation	
9	no Move 3 limitation		27	no Move 3 limitation	
10 ongo	but	1	28	no Move 3 limitation	
11	no Move 3 limitation		29	no Move 3 limitation	
12 1.past 2.ongo	1. move: but 2. move: although	1 1	30 1.ongo 2.ongo	1. move: 2. move: but	0 1
13	no Move 3 limitation		31 ongo		0
14 ongo	but	1	32	no Move 3 limitation	
15	no Move 3 limitation		33 ongo	but	1
16	no Move 3 limitation		34 1.ongo 2.ongo 3.ongo	1. move although 2. move 3. move	 1 0 0
17 past	but	1	35 1.ongo 2.ongo	1. move: but	1
18	no Move 3- limitation				

overall number: 25 moves **1/3=8**

contrastive conjuctions: 17x = grammatical feature

Table 4.4: Grammatical features defined in Move 3 limitation

Grammatical feature	Number of occurrences
Verbal,non-verbal negation	19x
Present simple	18x
Contrastive conjuction	17x
Locative expressions	10x
Extrinsic modal verbs	9x

The occurrence of grammatical features: Move 3 previous study

Table 5: past simple, **pres. simple (p.s.)**, pres. perfect (p.p); *modal verb(m.v.) 'would'*

article	Grammatical. feature	occurrence	article	Grammatical feature	occurrence
1	stumbled, found, took	1 past	19	no M. 3 prev. study	
2	no M. 3 prev. study		20	have found, **use, know**, **hear, hears**, have heard, *will hear*	**1p.s. /** 1p.p / 1 *m.v*
3	no M 3- prev. study		21	no Move 3 previous study	
4	no Move 3 prev.study		22	have taken and placed, *would grow*	1p.p / 1 *m.v.*
5	were, lacked	1 past	23	no M. 3 prev. study	
6	no M. 3 prev. study		24	no M. 3 prev. study	
7	no M. 3 prev. study		25	no M. 3 prev. study	
8	no M. 3 prev. study		26	know, are involved, said, is	
9	no M. 3 prev. study		27	no M. 3 prev. study	
10	no M. 3 prev. study		28	have been, was made, **is, fall apart**	**1 p.s.** / 1 past / 1 p.p.
11	no M. 3 prev. study		29	no M. 3 prev. study	

12	no M. 3 prev. study		30	no M. 3 prev. study	
13	no M. 3 prev. study		31	no M. 3 prev. study	
14	no M. 3 prev. study		32	no M. 3 prev. study	
15	no M. 3 prev. study		33	no M. 3 prev. study	
16	no M. 3 prev. study		34	no M. 3 prev. study	
17	explored, used, laid, was, *would serve*	1 past /1 *m.v.* / **1 p.s**	35	has been shown, is involved	**1p.s.** / 1p.p
18	**builds, don´t realize, show**, *would light up*, said, had explained, **see, hear**	**1 p.s**./1 p.p. / 1 *m.v.* 1 past			

overall number: 9 **1/3 = 3**

past simple 4x = grammatical feature present simple 4x = grammatical feature
present perfect 4x = grammatical feature would 3x = grammatical feature

Table 5.1: that- clause

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1		0	19	no Move 3 previous study	
2	no Move 3 previous study		20	have found that	1
3	no Move 3 previous study		21	no Move 3 previous study	
4	no Move 3 previous study		22		0
5		0	23	no Move 3 previous study	
6	no Move 3 previous study		24	no Move 3 previous study	
7	no Move 3 previous study		25	no Move 3 previous study	
8	no Move 3 previous study		26	we know that	1
9	no Move 3 previous study		27	no Move 3 previous study	
10	no Move 3 previous study		28		0
11	no Move 3 previous study		29	no Move 3 previous study	
12	no Move 3 previous study		30	no Move 3 previous study	
13	no Move 3 previous study		31	no Move 3 previous study	
14	no Move 3 previous study		32	no Move 3 previous study	
15	no Move 3 previous study		33	no Move 3 previous study	
16	no Move 3 previous study		34	no Move 3 previous study	
17	the hope was that…	1	35	it has been shown that	1
18	showing, that	1			

the overall number: 9 **1/3 = 3**

that – clause: 5x = grammatical feature

Table 5.2: Defined grammaticak features in Move 3 previous study

Grammatical feature	Number of occurrences
That - clause	5x
Simple present tense	4x
Past simple	4x
Present perfect	4x
Modal verb – would	3x

The occurrence of grammatical features: Move 4

Table 6: passive structure, **condensed passive**

article	Grammatical feature	occurrence	article	Grammatical. feature	occurrence
1 2x	1.move: will be published 2. move	1 / **0** 0 / **0**	19		0
2	no Move 4		20		0
3		0 / **0**	21	no Move 4	
4	reported, is identified	1 / **1**	22	conducted by	0 / **1**
5	published	1 / 0	23 2x	1. move: published 2 .move:	0 / **1** 0 / **0**
6	were presented	1 / **0**	24	published; conducted by	0 / **1**
7		0 / **0**	25		0
8	published	0 / **0**	26	will be published	1 / **0**
9	had bee taught	1 / **0**	27		0 / 0
10	detailed	0 / **1**	28		0 / 0
11 2x	1. move: are published 2. move:	1 / **0** 0 / **0**	29	led by, detailed	1 / **0**
12		0 / **0**	30	led by	0 / **1**
13		0 / **0**	31	published	0 / **1**
14 2x	1. move: to be published 2. move: be blocked	0 / **1** 0 / **1**	32	published	0 / **1**
15		0 / **1**	33		0 / **0**
16	no Move 4		34	have been approved, have not yet been exposed	1 / **0**
17		0 / **0**	35	no Move 4	
18 2x	1. move 2. move: founded by, is detailed	0 1 / **1**			

overall number: 37 **1/3 = 12**

passive finite, condensed passive: 22x = grammatical feature
(condensed passive 12x;passive structures 10x)

Table 6.1: locative expression: adverbial of place (AP), postmodifications by PP (Postm.)

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1 2x	1.move: in 11 articles in a special edition 2. move	1 AP 0	19	in the Nov.13 Cell	1 AP
2	no Move 4		20	in Nijmegen	1 AP
3		0	21	no Move 4	
4	In this week's issue of the journal Nature	1 AP	22	at the Ecole Centrale	1 postm.
5	in the latest issue of Nature Genetics	1 AP	23 2x	1. move: In the Journal of Pain 2.move: At the Université de Montreál	1 AP 1 postm.
6	At a recent meeting of the…; in an upcoming issue of the Journal …	1 AP	24	In December 2009 issue…; At Yale, Ohio State …	1 AP 1 postm.
7	In tomorrow's issue of the Journal Science	1 AP	25	In the December 2009 issue…	1 AP
8	In the open-access journal	1 AP	26	In the February 2010 issue	1 AP

9		0	27	At the 62nd Annual Meeting	1 AP
10	In the Oct.16 issue of the…	1 AP	28	In the Journal of the American …	1 AP
11 2x	1. move: in the November issu 2. move: in at least one knee	1 AP 1 AP	29	In Switzerland; in the Oct.7 issue of the Journal	1 AP
12	in Germany	1 AP	30	in the Science Journal Nature	1 AP
13		0	31	In the January 5 issue …	1 AP
14 2x	1. move: In the early edition 2. move: In New York	1 AP 1 AP	32	In the December 2009 issue of PM&R	1 AP
15	At Yale University	1 postm.	33	in a recent issue of the …	1 AP
16	no Move 4		34	In the Nov. 5 new England Journal…	1 AP
17	In the Proceedings of the National	1 AP	35	no Move 4	
18 2x	1. move 2. move: in the Nov. issue of the journal Nature	0 1 AP			

overall number: 37 **1/3 = 12**

locative expressions: 32x = grammatical feature

Table 6.2: present simple

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1 2x	1.move: are, *will be published* 2.move: credit	1 1	19	makes, suggest	1
2	no Move 4		20	*wanted to*, has to	1
3	*are carrying, are studying*		21	no Move 4	
4	*Involved*, is identified,	1	22	*could be*	0
5	are	1	23 2x	1. move: *could be* 2. move: *launched*, play, grow up	0 1
6	*were presented, will appear*	0	24	*was conducted*, is	1
7	*will present*	0	25	present	1
8	show, can improve,are, may be	1	26	*will be published*	0
9	are, *has been taught*	1	27	*will present*	
10	*has set*	0	28	appear	1
11 2x	1. move: are published, 2. move: explains, may develop	1 1	29	*detailed*	0
12	*has seen,* have, is,says,backs up	1	30	*have concluded*, have	1
13	says, had, unearthed	1	31	is, may raise	1
14 2x	1. move: *could be blocked* 2. move: says. *decided*	 1	32	*compared*	
15	*are trying*		33	Appears, reports,	1
16	no Move 4		34	*have been approved*, can treat, report	1
17	can store up	1	35	no Move 4	
18 2x	1. move: flips 2. move: is detailed	1 1			

overall number: 37 **1/3 = 12**

present simple: 23x = grammatical feature

Table 6.3: **Grammatical features defined in Move 4**

Grammatical feature	Number of occurrences
Adverbial of place	32x
Simple present tense	23x
Passive structure and the condenses passive	22x

The occurrence of grammatical features: Move 5

Table 7: the present simple, the **past simple**

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1	believe, support, is, shows; **were discovered**, **studied**, **evolved, said**	1 / **1**	19	*had proposed,* says **could disrupt**	1 / **1**
2	**Didn´t find, seemed, increased**; are	1 / **1**	20 2x	1 move: helps train 2. move: report, says, is, is supposed doesn´t help; **helped,** *had heard*, saw	1 / **0** 1 / **1**
3	say; **were suckled, were**	1 / **1**	21 2x	1. move: says;**listened, included,suggested,were,found** 2. move: says, **felt, were, believed**	1 / **1** 1 / **1**
4	believes, may be, builds up	1 / **0**	22	are	1 / **0**
5 2x	1. move: **found, had** 2. move: **detected**	0 / **1** 0 / **1**	23	tend, have, leads ; **found**	1 / **1**
6	*Have found*, predate; **was**	1 / **1**	24	**improved, showed, ended, gained, noted**	0 / **1**
7	has suggested, were covered	0 / **1**	25	occurs, may modify	1 / **0**
8	show, can tune; **showed, enhanced, reduced**	1 / **1**	26	exist, are taken, are, is; **added**	1 / **1**
9	**were, identified**	0 / **1**	27	may help, plan, is performed	1 / **0**
10	help, cause, can be removed, help; **said**	1 / **1**	28	**noticed**, *had taken*, **was, said**	0 / **1**
11	appears, are, include, believe	1 / **0**	29	**announced, found, had**	0 / **1**
12	are, reports; **tried out, produced**	1 / **1**	30 2x	1.move: might slow down 2. move: believe, may help solve, has	1 / **0** 1 / **0**
13 3x	1.move: believe 2. move: believe; **died** 3. move: says, **was**	1 / **0** 1 / **1** 1 / **1**	31	**were, returned, continued, was**	0 / **1**
14 2x	1. move: says 2. move: **worked, made**	1 / **0** 0 / **1**	32	appears **observed, were observed,**	1 / **1**
15	thinks, is thought; **gave, had, had recovered**,	1 / **1**.	33	**turned, double-checked, dunked, smelled**	0 / **1**
16	shows, is; **discovered**	1 / **1**	34	appear, can spawn	1 / **0**

17	can carry, can be incorporated	1 / **0**	35	**wasn´t, showed**	0 / **1**
18	suggests; **listened to**	1 / **1**			

overall number of moves: 42 **1/3=14**

present simple 30 = grammatical feature
past simple 29= grammatical feature

Table 7.1: passive structure and **condensed passive**

article	Grammatical feature	occurrence	article	Grammatical. feature	occurrence
1	Found, were discovered	1 / **1**	19		0 / **0**
2	**discovered**	0 / **1**	20 2x	1. move: 2.move:	0 / **0** 0 / **0**
3	were or are being suckled	1 / **0**	21 2x		0 / **0**
4	**caused by**	0 / **1**	22	**identified**	0 / **1**
5 2x	1. move: 2. move:	0 / **0** 0 / **0**	23		0 / **0**
6		0 / **0**	24		0 / **0**
7	were covered	1 / **0**	25		0 / **0**
8		0 / **0**	26	**thought**	0 / **1**
9	was being addressed	1 / **0**	27	is performed	1 / **0**
10	be removed	1 / **0**	28		0 / **0**
11		0 / **0**	29	**announced**	0 / **1**
12		0 / **0**	30 2x	1. move: 2. move: **produced**	0 / **0** 0 / **1**
13 3x	1.move: 2. move: 3. move:	0 / **0** 0 / **0** 0 / **0**	31		0 / **0**
14 2x	1.move 2.move: **produced by**	0 / **0** 0 / **1**	32	were observed	1 / **0**
15	were chosen	1 / **0**	33		0 / **0**
16		0 / **0**	34		0 / **0**
17	can be incorporated	1 / **0**	35		0 / **0**
18		0 / **0**			

overall number of moves: 42 **1/3=14**

passive structure, condensed passive 17x = grammatical feature

Table 7.2: that-clauses

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1	Believe that, support that	1	19	had proposed that	1
2		0	20 2x	1.move: 2.move: report that	0 1
3		0	21 2x	1.move: suggested that 2.move: believed that	1 1
4	believes that	1	22		
5 2x	1.move: found that 2.move:	1 0	23	found that	1
6		0	24		0
7		0	25		0
8	show that	1	26		0
9		0	27		0
10		0	28	noticed that	1

11	believe (that)	1	29	found that	1
12		0	30 2x	1.move: 2.move: believe (that)	0 1
13 2x	1.move: believe (that) 2. move	1 0	31		0
142x		0	32		0
15	thinks that	1	33		0
16	shows that	1	34		0
17		0	35		0
18	suggests that	1			

overall number of moves: 42 **1/3=14**

that – clause 17x = grammatical feature

Table 7.3: Contrastive conjunctions

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1		0	19	but	1
2		0	20 2x	1.move: 2.move: but	 1
3		0	21 2x	1.move: but 2.move: but	1 1
4		0	22		0
5 2x	1.move: 2.move:	0 0	23		0
6	but	1	24	although	1
7	but	1	25		0
8		0	26		0
9		0	27		0
10		0	28		0
11		0	29		0
12	but	1	30 2x	1.move: 2.move:	0 0
13 3x	1.move: 2. move: but	0 1	31	but	1
14 2x	1. move 2. move	0 0	32		0
15	but	1	33	but	1
16		0	34	Although, however	1
17		0	35		
18		0			

overall number of moves: 42 **1/3=14**

contrastive conjunction: 14x = grammatical feature

Table 7.4: locative expressions: adverbial of place (AP), posmodifications by PP (Postm.)

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1	In what is now Aramis, Ethiopia, in Africa	1 AP	19	at the hospital for sick children, in Toronto	1 Post.
2		0	20 2x	1. move: 2. move: on the screen	0 1 AP
3	from department, At UAB	1 Post.	21 2x	1. move: 2. move:	0 0
4	in the hippocampus of the brain	1 AP	22		0
5	1. move:	0	23		0

2x	2. move:	0			
6	in sediments, in the area	1 AP	24	In disruptive behaviour	1
7	In China	1 AP	25	In the early stages of Alzheimer´s disease	1 AP
8		0	26	In mathematics	1 AP
9		0	27		0
10		0	28		0
11		0	29		0
12		0	30 2x	1. move: in its lithium content 2. move: in the big bang	1 AP 1 AP
13 3x	1. move: 2. move: in what is now the Free state … 3. move:	0 1 AP 0	31		0
14 2x	1. move: 2. move:	0 0	32	in the hip, in the knee flexion	1 AP
15		0	33	in samples of wine, in samples with …	1 AP
16	in China´s Liaoning province	1 AP	34		0
17	into flexible battery; in electric vehicles	1 AP	35	in contractions for the spontaneously …	1 AP
18		0			

overall number of moves: 42 **1/3=14**

adverbial of place 15x = grammatical feature

7.5: relative clauses finite, non-finite

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1	remains, which were discovered… is hominid species, that lived 4.4. million years ago …	1 finite 1finite	19	evidence supporting the idea	1 non-fin.
2		0	20 2x	1. move: 2. move: words that they´d already heard …	0 1
3	researchers, who were in charge …	1 finite	21 2x	1. move: stories that included real scary creature 2. move:	1 finite 0
4	enzyme, that builds up …	1 finite	22	organisms identified	1 non-fin.
5 2x	1. move: 2. move:	0 0	23		0
6		0	24	the group receiving combination therapy …	1 non-fin.
7	changes that led to flight	1 finite	25	oxidative stress, which occurs in the early stages … molecules, resulting in loss	1 finite 1 non-fin.
8		0	26	disabilities, which are sometimes associated	1 finite

				with factors thought to produce	1 non-fin.
9		0	27	surgery, which is performed on babies …	1 finite
10	brain that cause epileptic seizures researchers who studied the language network	1finite 1 finite	28		
11	approach that appears to be an applicable treatment…	1 finite	29	people who rated themselves highly stressed …	1 finite
12		0	30 2x	1. move: 2. move: Sun´s lithium levels, which has 140 times less lithium … amount produced in …	0 1 finite 1 non-fin
13 3x	1. move: 2. move: 3. move:	0 0 0	31	those who continued smoking …	1 finite
14 2x	1. move: 2. move: substance produced by	0 1 non-fin.	32	shoes compared with barefoot	1 non-fin.
15		0	33		0
16	group, that independently lost their teeth … group is the most primitive, suggesting it could provide…	1 finite 1 non-fin.	34		0
17	sheet that can carry a charge … low cost, that could help lower the price …	1 finite	35		0
18	the finding, based on experiments…	1 non-fin.			

overall number of moves: 42 **1/3=14**

relative clauses: 28x = grammatical feature
(finite relative cl.: 18x; non-finite relative cl.: 10x)

Table 7.6: Defined grammatical features of Move 5

Grammatical feature	Number of occurrences
Present simple	30x
Past simple	29x
Relative clauses	28x
Passive structure, condensed passive	17x
That – clause	17x
Adverbial of place	15x
Contrastive conjunctions	14x

The occurrence of grammatical features: Move 6

Table 8: the past simple

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1	*has been*	0	19	used, *had been trained*, were able to	1
2	were made **looks for**	1 .	20 2x	1. move: chose 2. move: were, watched, was edited, *are getting in*, **start**, saw, heard, *they´d heard*	1 1
3 3x	1. move: collected, removed, substituted 2. move: collected, were extracted, substituted, *had been reconstructed*, were activated by, were transferred 3. move: were cloned	1 1 1	21	asked, featured, came, could, chose	1
4	treated	1	22	took	1
5 3x	1. move: looked at 2. move: analyzed, **suffer** 3. move: worked, **play**	1 1 1	23	were recruited,	1
6 2x	1. move: existed 2. move: took, featured, analyzed, **can indicate**	1 1	24	were asked, tested, **involves**, were taught, included, related, were given	1
7	Reconstructed	1	25	No move 6	
8	were, watched, depicts, were asked, could, *had been heard,* were	1	26	used, *had been diagnosed*	1
9	made, played, recorded, viewed, were given, were asked, were talking, were recorded	1	27 2x	1. move: **mitigate** *has been working* 2. move: **uses, allows, can explore, applies**	
10 3x	1. move: got 2. move: *are monitoring*, **can conduct, see, offer** 3. move: performed	1 1	28 2x	1. move: were trying, **is** 2. move: formed, absorbed, reflected	 1
11 2x	1. move: recruited, were, was, were selected, were asked, included 2. move: assigned, included	1 1	29 2x	1. move: ate**, contains** 2. move: was, **is**	1 1
12	analyzed, were, were harmed, analyzed, tended	1	30	looked at	1
13	have, had,	1	31	enrolled, did not have, were followed, were collected	1
14	used, tested	1	32	run, were selected, ran, was provided, was	1

				observed, were collected	
15	asked, were	1	33 2x	1. move: conducted, were offered, tasted, analyzed 2. move: double-checked,	1 1
16	compared	1	34 2x	1. move: recruited, had, worked 2. move: **received, contain, alerts**	1 1
17	created, suspended, heated, rolled up, used	1	35	got, exposed, measured	1
18	listened to, had to, were divided, was blown, heard	1			

overall number: 47 moves **1/3=15**

past simple: 38x = grammatical feature
pres. simple: 11x = not defined as a grammatical feature

Table 8.1: passive structure, **condensed passive**

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1		0 / **0**	19	had been trained	1 / **0**
2	were made by	1 / **0**	20 2x	1. move: 2. move: was edited, **spoken by**	0 / **0** 1 / **1**
3 3x	1. move 2. move were extracted and substituted, had been reconstructed, were activated by, were transferred 3. move:were cloned, **pointed to**	0 / **0** 1 / **0** 1 / **1**	21		0 / **0**
4		0	22		0
5 3x	1. move: **focused on**, 2. move: **led by**, 3. move: **needed**	0 / **1** 0 / **1** 0 / **1**	23	were recruited, were asked	1 / **0**
6 2x	1. move: 2. move: **drilled from**	0 0 / **1**	24	were asked**,** were taught, were given, **accompanied by**	1 / **1**
7	**based on**	0 / **1**	25	no Move 6	
8	were asked, had been heard, **taken from, spoken by**	1 / **1**	26	had been diagnosed	1 / **0**
9	were given, were asked, were recorded	1 / 0	27 2x	1. move: 2. move: **used**	0 / **0** 0 / **1**
10 3x	1. move: **sent by** 2. move: can be removed 3. move:	0 / **1** 1 / **0** 0 / **0**	28 2x	1. move: 2. move: are required	0 / **0** 1 / **0**
11 2x	1. move: were selected, were asked, 2. move: **assigned, being held**	1 / **0** 0 / **1**	29 2x	1. move: 2. move: is needed	0 / **0** 1 / **0**
12	were harmed	1 / **0**	30		0 / **0**
13			31	were followed, were	1 / **0**

				collected	
14	**grown**	0 / **1**	32	were selected, **selected**, was provided, was observed, were collected	1 / **1**
15			33 2x	1. move: were offered, 2. move:	1 / **0** 0 / **0**
16			34 2x	1. move: **caused by** 2. move:	0 / **1** 0 / 0
17	**suspended**	0 / **1**	35	**induced by**	0 / **1**
18	**focused on**, were divided, was	1 / 1			

overall number: 47 moves **1/3=15**

passive structure, condensed passive: 38x = grammatical feature
(condensed passive :18x ; passive structure: 20x)

Table 8:.3: relative clauses finite, **non-finite**

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1		0 / 0	19	mice that had been trained	1 / **0**
2	telescope, that looks for…	1 / **0**	20 2x	1. move: Mitterer, who is German 2. move: trainspotting, which was edited	1 / **0** 1 / **0**
3 3x	1. move: 2. move: the stimuli **occurring…** 3. move:	0 / **0** 0 / **1** 0 / **0**	21	a child who came in contact with …; a witch, which children could perceive …	1 / **0**
4		0	22		0 / **0**
5 3x	1. move: 2. move: researchers **led by Dr. Andrew Singleton** 3. move: data sets **needed to identify**; variations that play a role…	0 / **0** 0 / **1** 0 / **1** 1 / **0**	23		0 / **0**
6 2x	1. move: 2. move: **pieces of sediment drilled from …, those associated with**	0 / **0** 0 / **1**	24	program that actively involves parents ; disorders **accompanied by…**	1 / **1**
7	**Mahakala based on**	0 / **1**	25	no Move 6	
8	**excerpts taken from source spoken by the participants**	0 / **1**	26	children, who had been diagnosed with…	1 / **0**
9		0 / **0**	27 2x	1. move: surgery**, starting with images** 2. move: **those used**	0 / **1** 0 / **1**
10 3x	1. move: the **signals sent by electrodes** 2. move: 3. move:	0 / **1** 0 / 0 0 / 0	28 2x	1. move: oxide, which is black 2. move: the manganese **containing oxide**	1 / **0** 0 / **1**
11 2x	1. move: 2. move: participants assigned to the control group…	0 / 0 0 / **1**	29 2x	1. move: 2. move:	0 / **0** 0 / **0**
12	Babies who were …	1 / **0**	30		0 / 0

13		0 / **0**	31		0 / 0
14	Nerve cell **grown in culture**…	0 / **1**	32	shoes, **selected for …**	0 / **1**
15	animation drifting over	0 / **1**	33 2x	1. move: 2. move:	0 / **0** 0 / **0**
16		0 / 0	34 2x	1. move: women who had such skin; lesions **affecting** …; the abnormalities **caused** by…gynecologist who worked on the study… 2. move: injection that contain; **cells making** …	1 / **1** 1 / **1**
17	Nanotubes suspended in water	0 / **1**	35	women undergoing caesarean; those induced by	0 / **1**
18	sounds that involve	1 / **0**			

overall number: 47 moves **1/3=15**

relative clauses: 31x = grammatical feature
(finite relative cl.: 13x; non-finite relative cl.: 18x)

Table 8.4: to infinitive of purpose

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1		0	19	used tricks to block	1
2		0	20 2x	1. move: 2. move:	0 0
3 3x	1. move: 2. move: in order to clone 3. move:	0 1 0	21	asked children to listen to	1
4		0	22	took a more holistic approach to estimate	1
5 3x	1. move: 2. move: 3. move: worked together to compile; data needed to identify	0 0 1	23		0
6 2x	1. move: 2. move: took the samples to look	0 1	24		0
7		0	25	no Move 6	
8		0	26	researchers used DTI to scan	1
9	Viewed pictures of babies to provoke speech	1	27 2x	1. move: Marsden has been working with surgeons to develop… 2. move: tool uses data to construct	1 1
10 3x	1. move: 2. move: 3. move:	0 0 0	28 2x	1. move: 2. move:	0 0
11 2x	1. move: patients were asked to participate 2. move:	. 0	29 2x	1. move: research is needed to verify 2. move:	1 0
12		0	30		0

13		0	31		0
14	tested non-specific HDAC inhibitors to assess…	1	32		0
15	Golomb asked 32 people to watch	1	33 2x	1. move: 2. move:	0 0
16		0	34 2x	1. move: 2. move:	0 0
17	heated the paper to drive off …	1	35	researchers got permission to take samples	1
18	had to press a button to indicate	1			

overall number: 47 moves **1/3=15**

infinitive of purpose: 16x = grammatical feature

Table 8.5: Locative expressions: adverbials of place (AP), postmodifications by PP (post.)

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1			19	At the Universitz … in a particular cage	1 Post. 1 AP
2	In Chile	1 AP	20 2x	1. move: 2. move: from the Melbourne	0 1 Post.
3 3x	1. move: to receptor female 2. move: from several female mice 3. move: in their research, in the first group	1 AP 1 Post. 1 AP	21	in the stories	1 AP
4		0	22	in the tested cigarettes	1 AP
5 3x	1. move: in Japan, in the US, in the first study 2. move: in the second study 3. move:	1 Post. 1 AP	23	From a francophone high school in Montreal, Canada	1 Post.
6 2x	1. move: in the area, in ancient sediments layers 2. move: drilled from the ground, in these sediment layers	1 AP 1 Post. 1 AP	24	In this new study	1 AP
7			25	no Move 6	
8	In the study, Kath from Kath & Kim	1 AP	26	In an earlier study	1 AP
9	From each of eight English-speaking mothers	1 Post.	27 2x	1. move: at Rady Chilfren´s Hospital and Stanford University 2. move:	1 Post. 0
10 3x	1. move: in the brains of epileptics 2. move: in these patients 3. move:	1 AP 1 AP 0	28 2x	1. move: 2. move:	0 0 0
11 2x	1. move: from the greater Boston area 2. move:	1.Post 0	29 2x	1. move: from the participants 2. move:	1 AP
12		0	30		0
13	on the end of the hands	1 AP	31		0
14	In culture	1 AP	32	From the general	1 AP

				population	
15		0	33 2x	1. move: in samples of wine 2. move:	1 AP
16		0	34 2x	1. move: 2. move:	0 0
17	In an oven, in both lithium-ion batteries	1 AP	35	at the Royal Victoria Infirmary in Newcastle	1 Post. 0
18		0			

overall number: 47 moves **1/3=15**

locative expressions: 30x = grammatical feature

Table 8.6: **Defined grammatical features of Move 6**

Grammatical feature	Number of occurrences
Past simple	38x
Passive structure and condensed passive	38x
Relative clauses: finite, non-finite	31x
Locative expressions:	30x
Infinitive of purpose	16x

The occurrence of grammatical features: Move 7

- deductive way (deduc.) / celebrative way of introducing information (celeb.)

Table 9: past tense; **present tense**

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1 4x	1. move (deduc.): **say, push back** **tells, is, are,** said, **reveals**, weighted*, had, possessed, would have helped,* was believed, had, **indicate**, ate, **say** 2. move (deduc.): **hypothesize**, took, **help**, evolved, **say** 3. move (celeb.): **revolutionize**, understood, said 4. move (celeb.): points. are, said	**1 / 1** **1** / 1 **1** / 1 1 / 0	19 3x	1. move (celeb.): **suggests, weaken, disrupt, encode** 2. move (celeb.): *had been blocked,* found, **boosts**, sped, were cleared 3. move (deduc.): **doesn´t mean, aren´t, says, do not deny, says, could have**	**1** / 0 **1** / 1 **1** / 0
2	said, **support, is, are,** said, **doesn´ t like**,said, **is, have, are, suggests, have**, **are**, said, was not, said, **is, must be crowded, shows,** *have taken*,	**1** / 1	20	(deduc.) **makes, says, read, are bringing, are not hearing, interferes**	**1** / 0
3 3x	1. move: **are**, were able, became, died, was born	**1** / 1 **1** / 1	21 3x	1. move (celeb.) **says**, dealt with, wasn´t, 2. move (deduc.): wanted	**1** / 1 **1** / 1

	2. move: *has shown*, **seem**, would favour, **is**, was used, *has focused on, has improved* 3. move: pointed	**0** / 1		to, , **is, understand, is, comes, says**, were able, wasn´t, **says, use, is, is not** 3. move (deduc.): **says, say, are scared, don´t need, doesn´ t exist,** absorbed, **is, go, think, says, is, explain, aren´t**	**1** / 1
4 2x	1. move: led, found, **affects**, showed, had, 2. move: rescued, helped, **counteract**	**1** / 1 **1** / 1	22 3x	1. move (celeb.): were surprised, **says**, tested, were, *had hypothesized*, didn´t think, we´d find, **are** 2. move (deduc.) **can survive, go on, suggests, can be transmitted**, would account, **are characterized by** 3. move (deduc.): **show**, were present, **is, included, causes**	**1** / 1 1 1 / 1
5 2x	1. move: compared, found, were 2. move: **have, says**	0 / 1 **1** / 0	23 2x	1. move (celeb.): **is, have, may perceive, says, feel, might express,** 2. move (deduc.): **must be considered,**	**1** / 0 **1** / 0
6 2x	1. move (deduction.): detected, found, **suggests, are using,** said 2. move (celebr..): **is supported, is, suggests, say**	**1** / 1 **1** / 0	24	**show, can be delivered**, were, said, **shows, is**	**1** / 1
7 6x	1. move (deduc.): **bolsters**, decreased, discovered 2. move (celeb.): *has been considered*, said, **is providing** 3. move (celeb.): **indicate**, was not, had, sad 4. move (deduc.): were thought, **are known**, *have been feathered, have had*, said 5. move (celeb.):said, **fits**, evolved 6. move (deduc.): added, might have helped	**1** / 1 **1** / 1 **1** / 1 **1** / 1 **1** / 1 **0** / 1	25 2x	1. move (celeb.): **is expressed, may lead**, showed, **is modified**, led to, resulted in, **may provide** 2. move (deduc.): **suggests, impairs**, **could have**	**1** / 1 **1** / 0
8 2x	1. move (celeb.): found, were associated, enhanced, led, **appear**, *have helped*, *had been uttered*, 2. move (deduc.) **can**	**1** / 1 **1** / 1	26 2x	1. move (deduc.): found, **show**, said, **are, might be**, 2. move (celeb.): *has shown,* **is associated, seem, are, demonstrate,**	**1** / 1 **1** / 0

	use, sound, perceive, is spoken, seems, was spoken, told, was, were, made, did not provide, told, meant, *may have drawn*			**provides, works,** said**, help understand,**	
9	(celeb.) **is, are able, don´t speak,** said, **talk, do, tend to sound**	1 /	27 3x	1. move (deduc.): is, **connects**, *would bring*, **becomes**, 2. move (celeb.): *have developed*, **is expected** 3. move (celeb.): **says, can test, evaluate,**	**1** / 0 **1** / 0 **1** / 0
10 2x	1. move (deduc.): found, corresponded to, **fit, shows**, **is involved, happen** , said 2. move (celebr.): **may be, processes, is not, speaks, listens**, said	**1** / 1 1 / 1	28	Deduc. *have proven*, said,	**0** / 0
11	(celeb.) exhibited, noted, observed	0 / 1	29 3x	1. move (deduc.): found 2. move (celeb.): resulted in, wrote, was, 3. move (deduc.): **adds, can have**	0 / 1 0 / 1 **1** / 0
12 2x	1. move (celeb.) **indicate, are making**, *will be saying*, **says, makes** 2. move (celeb.) was reading, **says**, knew, **can hear, have, is affecting, is, points out, have**, suggested, lacked	1 / 0 **1** / 1	30 3x	1. move (deduc.): found, **have** 2. move (celeb.): **believe**, could be 3. move (deduc.): **propose, might slow down, increases**, *would result*	**1** / 1 **1** / **1** / 0
13 3x	1. move (deduc.): **is thought**, weighed 2. move (celeb.): says, **is, is caught** 3. move (celeb.) **Says**, *has changed*, thought, evolved, became, were, is showing	**1** / 1 **1** / 0 **1** / 1	31 2x	1. move (deduc.): smoked, gained, had, **quit**, gained, saw 2. move (deduc.): **suspect, is related to, put, should use**, **is**	**1** / 1 **1** / 0
14 2x	1. move (celeb.) Were, **promotes, causes, says,** narrowed, designed, *would block*, **is, believe, act, is, can be, says** 2. move (deduc.) **says, are, is, says, suggests, may be seen, are applied**,	1 / 1 1 / 0	32 2x	1. move (deduc.): **confirm, provides, is, are caused** 2. move (celeb.): **state**, observed, **is**, was reported, **is, is experienced, represent**	**1** / 0 **1** / 1
15 2x	1. move (deduc.): was, found, *would do*, performed, was	/ 1	33 3x	1. move (deduc.): **report**, *haven´t yet isolated*, **reacts, suspect, is**	**1** / 0

	impaired, **says** 2. move (celeb.):**is thought, says, can impact, know, can affect, sees**	1 / 0		2. move (celeb.): were surprised, says, thought, **represent, does, explains**, **does not induce, says, offer** 3. move (deduc.) **is, says**, **are,** *would overwhelm*, **says, pairs**	**1** / 1 **1** / 0
16 2x	1. move (deduc.): found, were adapted**, think,** *may have put*, *would be*, **write** 2. move (celeb.): **is, says, remains,** *wouldn´t make*	**1** / 1 **1** / 1	34 4x	1. move (deduc.): **is, can go away, says**, *will deliver*, *will establish* 2. move (deduc.) *had disappeared*, showed, appeared, died, was completed 3. move (deduc.): **mobilizes, can root**, *have invaded*, **says, survive, induce, contribute, get, serves,** 4. move (deduc.): benefitted, cleared out, *have not been shown*, **says, stimulate, lie, makes,** *have never been exposed*	1 / 0 0 / 1 1 / 0 1 / 1
17	(celeb.) **is, says, hold, is, adds, enables**	**1** / 0	35 3x	1. move (deduc.): showed, increased, led, said, *will not give*, **can damage, does show, act, are investigating** 2. move (celeb.): funded. said, *has uncovered*, **regulate** 3. move (deduc.): **is, are using,** *have been*, **are targeting**, *have not known*	1 / 1 1 / 1 1 / 1
18 3x	1. move (deduc.): **have, think, have, think, is,** told 2. move (celeb.): **views** 3. move (deduc.): was puffed, perceived, said, *would indicate*, didn ´t **show**, got, showed	**1** / 1 **1** / 0 **1** / 1			

the overall number of moves: 82 **1/3 = 27**

present simple: 73x = grammatical feature
past simple: 51x = grammatical feature

Table 9.1: passive structure and **condensed passive**

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1 4x	1. move (celeb.): collected, was believed 2. move (deduc.): 3. move (celeb.): 4. move (celeb.):	1 / **1** 0 / **0** 0 / **0** 0 / **0**	19 3x	1. move (celeb.): 2. move (celeb.): had been blocked, were cleared 3. move (deduc.):	0 / **0** 1 / **0** 0 / **0**
2	**must be crowded**	0 / **1**	20	(deduc.)	0 / **0**
3 3x	1. move (celeb).: obtained by, was born 2. move (deduc.): carried out, transferred, was used 3. move (deduc.):	1 / **1** 1 / **1** 0 / **0**	21 3x	1. move (celeb.) 2. move (deduc.): 3. move (deduc.): are absorbed	0 / **0** 0 / **0** 1 / **0**
4 2x	1. move (deduc.): known, deprived of 2. move (celeb.):	0 / **1** 0 / **0**	22 3x	1. move (celeb.): 2. move (deduc.) **can be transmitted**, **are characterized by** 3. move (deduc.):	0 / **0** 0 / **1** 0 / **0**
5 2x	1. move (deduc.): 2. move (celeb.): involved	0 / **0** 1 / **0**	23 2x	1. move (celeb.): 2. move (deduc.): **must be considered,** have not been considered	0 / **0** 1 / **1**
6 2x	1. move (deduction): 2. move (celebr**.):** is supported	0 / **0** 1 / **0**	24	(Celeb.) can be delivered,	1 / **0**
7 6x	1. move (deduc.): 2. move (celeb.): has been considered 3. move (celeb.): 4. move (deduc.): were thought, **are known**, have been feathered, 5. move (celeb.): 6. move (deduc.):	0 / **0** 1 / **0** 0 / **0** 1 / **0** 0 / **0** 0 / **0**	25 2x	1. move (celeb.): is expressed, is modified, 2. move (deduc.):	1 / **0** 0 / **0**
8 2x	1. move (celeb.): were associated, had been uttered, 2. move (deduc.) was spoken,	1 / **0** 1 / **0**	26 2x	1. move (deduc.): 2. move (celeb.):	0 / **0** 0 / **0**
9	(celeb.)	0 / **0**	27 3x	1. move (deduc.): performed 2. move (celeb.): is expected 3. move (celeb.):	0 / **1** 1 / **0** 0 **/ 0**
10 2x	1. move (deduc**.):** is involved 2. move (celebr.): **called**	1 / **0** 0 / **1**	28	Deduc.	0 / **0**
11	(celeb.)	0 / **0**	29 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc.):	0 / **0** 0 / **0** 0 / **0**

12 2x	1. move (celeb.) 2. move (celeb.)	0 / **0** 0 / **0**	30 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc.): being transported, could be fused	0 / **0** 0 / **0** 1 / **0**
13 3x	1. move (deduc.): is thought, 2. move (celeb.): is caught 3. move (celeb.)	1 / **0** 1 / **0** 0 / **0**	31 2x	1. move (deduc.): 2. move (deduc.): is resulted	1 / **0** 1 / **0**
14 2x	1. move (celeb.) 2. move (deduc.) obtained by, are applied	0 / **0** 1 / **0**	32 2x	1. move (deduc.): are caused 2. move (celeb.): was reported, is experienced	1 / **0** 1 / **0**
15 2x	1. move (deduc.): was impaired, 2. move (celeb.):is thought**,**	1 / **0** 1 / **0**	33 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc.)	0 / **0** 0 / **0** 0 / **0**
16 2x	1. move (deduc.): were adapted 2. move (celeb.):	1 / **0** 0 / **0**	34 4x	1. move (deduc.): 2. move (deduc.) was completed 3. move (deduc.): 4. move (deduc.): have not been shown, have never been exposed	0 / **0** 1 / **0** 0 / **0** 1 / **0**
17	(celeb.)	0 / **0**	35 3x	1. move (deduc.): 2. move (celeb.): could be linked 3. move (deduc.):	0 / **0** 1 / **0** 0 / **0**
18 3x	1. move (deduc.): based on, 2. move (celeb.): 3. move (deduc.): was puffed	0 / **1** 0 / **0** 1 / **0**			

the overall number of moves: 82 **1/3 = 27**

passive structure and condensed passive: 35x = grammatical feature

Table 9.2: that - clauses

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1 4x	1. move (celeb.): Ardipithecus tells us is, that we as humans…; skeleton reveals that…; teeth indicate that … 2. move (deduc.): scientists hypothesize that…; beliefs that humans evolved 3. move (celeb.): 4. move (celeb.):	1 1 0 0	19 3x	1. move (celeb.): 2. move (celeb.): 3. move (deduc.):	0 0 0
2	(celeb.) said (that) the results support…; theory that …	1	20	(deduc.)	0

	confident that there are… said that …; the discovery suggested that…; said (that) finding 32 planets…				
3 3x	1. move (celeb.): 2. move (deduc.): researchers has shown that… 3. move (deduc.):	0 1 0	21 3x	1. move (celeb.) 2. move (deduc.): by reminding themselves that … 3. move (deduc.): convince their child that …	0 1 1
4 2x	1. move (deduc.): team of researchers that found that …; study showed that mice deprived of sleep…; 2. move (celeb.):	1 0	22 3x	1. move (celeb.): 2. move (deduc.): researchers suggest that … 3. move (deduc.):	0 1 0
5 2x	1. move (deduc.): the two teams found that … 2. move (celeb.):	1 0	23 2x	1. move (celeb.): it is possible that … 2. move (deduc.):	1 0
6 2x	1. move (deduction): which suggests that … 2. move (celebr.): this suggests that …	1 1	24	(Celeb.) the results show that…	1
7 6x	1. move (deduc.): bolsters the idea that… 2. move (celeb.): 3. move (celeb.): the fossils indicate that 4. move (deduc.): 5. move (celeb.): that fits into theory that … 6. move (deduc.): Xu added that…	1 0 1 0 1 1	25 2x	1. move (celeb.): Kitchev et al showed that… 2. move (deduc.): group suggests that …	1 1
8 2x	1. move (celeb.): the researchers found that … 2. move (deduc.)	1 0	26 2x	1. move (deduc.): we found that …; suggesting that … 2. move (celeb.): researcher has shown that …	1 1
9	(celeb.)	0	27 3x	1. move (deduc.): 2. move (celeb.): 3. move (celeb.):	0 0 0
10 2x	1. move (deduc.): the finding shows that…and shows that… 2. move (celebr.): theory that Broca´ s area…	1 1	28	(deduc.)	0
11	(celeb.)	0	29 3x	1. move (deduc.): showing that certain elements… 2. move (celeb.): 3. move (deduc.):	1 0 0
12 2x	1. move (celeb.): the finding indicate that … 2. move (celeb.): researchers knew that …;	1 1	30 3x	1. move (deduc.): 2. move (celeb.): colleagues believe (that) …	0 1 1

	she points out that…studies suggested that…			3. move (deduc.): they propose that …	
13 3x	1. move (deduc.): 2. move (celeb.): 3. move (celeb.) it is showing that …	0 0 1	31 2x	1. move (deduc.): 2. move (deduc.): caution that …	0 1
14 2x	1. move (celeb.): 2. move (deduc.): the results suggest that …	0 1	32 2x	1. move (deduc.): the findings confirm that … 2. move (celeb.):	1 0
15 2x	1. move (deduc.): the team found that… 2. move (celeb.):	1 0	33 3x	1. move (deduc.): the researchers report that … 2. move (celeb.): we thought that…, he explains that… 3. move (deduc.)	1 1 0
16 2x	1. move (deduc.): 2. move (celeb.):	0 0	34 4x	1. move (deduc.): This is demonstration that… 2. move (deduc.): 3. move (deduc.): 4. move (deduc.):	1 0 0 0
17	(celeb.): the fact that …	1	35 3x	1. move (deduc.): the researchers show that … 2. move (celeb.): 3. move (deduc.): interesting thing is that … They are targeting (that) …	1 0 1
18 3x	1. move (deduc.): based on the fact that …; explanation is that… 2. move (celeb.): 3. move (deduc	1 0 0			

the overall number: 82 **1/3 = 27**

That-clause: 42x = grammatical feature

Table 9.3: relative clauses: finite relative cl., **non-finite relative cl.**

article	Grammatical. feature	occurrence	article	Grammatical feature	occurrence
1 4x	1. move (celeb.): 2. move (deduc.): 3. move (celeb.): 4. move (celeb.):	0 / **0** 0 / **0** 0 / **0** 0 / **0**	19 3x	1. move (celeb.): connections that encode… 2. move (celeb.): 3. move (deduc.):	1 / **0** 0 / **0** 0 / **0**
2	planets that are closer…	1 / **0**	20	(deduc.)	0 / **0**
3 3x	1. move (celeb).: the mice, obtained by…; spieces, which became … 2. move (deduc.): research carried out…; cell nucleos transferred to … 3. move (deduc.): an	1 / **1** 0 / **1** 1 / **0**	21 3x	1. move (celeb.) 2. move (deduc.): 3. move (deduc.):	0 / **0** 0 / **0** 0 / **0**

	inhibitor which has significantly improved…				
4 2x	1. move (deduc.): brain known to be … 2. move (celeb.):	0 / **1** 0 / **0**	22 3x	1. move (celeb.): cigarettes that we tested …; we didn´t think (that) we´ d find 2. move (deduc.) 3. move (deduc.):	1 / **0** 0 / **0** 0 / **0**
5 2x	1. move (deduc.): 2. move (celeb.): genetic variants involved in the progress	0 / **0** 0 / **1**	23 2x	1. move (celeb.): individuals who have insecure relationship…; who feel insecure… 2. move (deduc.):	1 / **0** 0 / **0**
6 2x	1. move (deduction): 2. move (celebr.):	0 / **0** 0 / **0**	24	(celeb.)	0 / **0**
7 6x	1. move (deduc.): paleontologists who discovered 2. move (celeb.): 3. move (celeb.): 4. move (deduc.): animals that were thought… 5. move (celeb.): 6. move (deduc.):	1 / **0** 0 / **0** 0 / **0** 1 / **0** 0 / **0** 0 / **0**	25 2x	1. move (celeb.): 2. move (deduc.):	0 / **0** 0 / **0**
8 2x	1. move (celeb.): 2. move (deduc.): speech that is spoken…	0 / **0** 1 / **0**	26 2x	1. move (deduc.): disorder, suggesting … 2. move (celeb.): areas, which are interrelated…; cognition that provides insight …	0 / **1** 1 / **0**
9	(celeb.)	0 / **0**	27 3x	1. move (deduc.): **surgeries performed immediately**…; veins that would bring …; it becomes oxygenated, allowing the patient to survive 2. move (celeb.): surgery that is expected… 3. move (celeb.):	1 / **1** 1 / **0** 0 / **0**
10 2x	1. move (deduc.): 2. move (celebr.): **area of the brain, called …**	0 / **0** 0 / **1**	28	(deduc.) aluminum oxide, which possesses similar properties.	1 / **0**
11	(celeb.) **Patients practicing Tai Chi**…	0 / **1**	29 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc.): **research showing…**	0 / **0** 0 / **0** 0 / **1**
12 2x	1. move (celeb.) sounds that are precursor… 2. move (celeb.)	1 / **0** 0 / **0**	30 3x	1. move (deduc.): 2. move (celeb.): colleagues believe (that) the key	0 1 / **0**

				3. move (deduc.): **lithium being transported…**	0 / **1**
13 3x	1. move (deduc.): 2. move (celeb.): 3. move (celeb.) features that we thought …	0 / **0** 0 / **0** 1 / **0**	31 2x	1. move (deduc.): those, who smoked 2. move (deduc.):	1 / **0** 0 / **0**
14 2x	1. move (celeb.): **drugs that would block…** 2. move (deduc.) **benefit obtained by blocking**	0 / **1** 0 / **1**	32 2x	1. move (deduc.): 2. move (celeb.): effect that was reported…	0 / **0** 1 / **0**
15 2x	1. move (deduc.): perception that we tend to use … 2. move (celeb.):	1 / **0** 0 / **0**	33 3x	1. move (deduc.): scallops that react …; acid, which could be braking … 2. move (celeb.): 3. move (deduc)	1 / **0** 0 / **0** 0 / **0**
16 2x	1. move (deduc.): 2. move (celeb.):	0 / **0** 0 / **0**	34 4x	1. move (deduc.): 2. move (deduc) 3. move (deduc.): agents that can root out viruses that have already invaded a cell…; viral proteins, which contribute to … 4. move (deduc.): antibodies that lie in wait…; viruses - which makes them …; women who have never been exposed…	0 / **0** 0 / **0** 1 / **0** 1 / **0**
17	(celeb.)	0 / **0**	35 3x	1. move (deduc.): Finner, who led the research…, agents that act on the enzymes … 2. move (celeb.): 3. move (deduc.):	1 / **0** 0 / **0** 0 / **0**
18 3x	1. move (deduc.): ideas, based on the fact… 2. move (celeb.): 3. move (deduc.):	1 / **0** 0 / **0** 0 / **0**			

the overall number: 82 **1/3 = 27**

relative clauses: 37 = grammatical feature
24x finite 12x non-fin.

Table 9.4: locative expressions: adverbials of place (AP), postmodifications by PP (postm.)

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1 4x	1. move (celeb.): collected from Ardi´s bone fragments… 2. move (deduc.): biologist at Kent… 3. move (celeb.): 4. move (celeb.): paleontologist at the Cleveland Museum	1 AP 1 Postm. 0 1 Postm.	19 3x	1. move (celeb.): in the hippocampus… 2. move (celeb.): from the hippocampus 3. move (deduc.): in memory acquisition	1AP 1AP 1 Postm.
2	celeb. from a conference in Portugal	1 Postm.	20	(deduc.) to the front of your mind	1 AP
3 3x	1. move (celeb).: researchers at UAB**…; in Spain**…; cell from the last animal…; 2. move (deduc.): 3. move (deduc.): improvements in the development …	 1 Postm. 1 AP 0 Postm.	21 3x	1. move (celeb.): 2. move (deduc.): 3. move (deduc.):	0 0 0
4 2x	1. move (deduc.): at the University … 2. move (celeb.): In the hippocampus…; In cAMP signaling	1 Post. 1 AP	22 3x	1. move (celeb.): in these products 2. move (deduc.): 3. move (deduc.): from soil microorganism to potential human …	AP AP
5 2x	1. move (deduc.): 2. move (celeb.):	0 0	23 2x	1. move (celeb.): 2. move (deduc.):	0 0
6 2x	1. move (deduction): in pollen grains; from native grasses… 2. move (celebr.): in the stories	1 AP 1 Postm. 1 AP	24	(Celeb.)	0
7 6x	1. move (deduc.): 2. move (celeb.): 3. move (celeb.): 4. move (deduc.): 5. move (celeb.): into the theory 6. move (deduc.):	0 0 0 0 1 AP 0	25 2x	1. move (celeb.): derived from human Alzheimer´s disease patients into mice 2. move (deduc.): In the ethiopathogenesis…	AP 1 Postm.
8 2x	1. move (celeb.): 2. move (deduc.): characters in the film…; away from unfamiliar speech…	0 0 1 Postm. 1 AP	26 2x	1. move (deduc.): in the children with FSAD…; in the left parietal area… 2. move (celeb.):	1 AP 0
9	(celeb.) at the university of California, Los Angeles	1 Postm.	27 3x	1. move (deduc.): into the right side of the heart 2. move (celeb.): 3. move (celeb.):	1 AP 0 0
10 2x	1. move (deduc.): in Broca´s Area 2. move (celebr.):	1 AP 0	28	deduc.	0
11	(celeb.) in knee pain…; in subjets in the Tai Chi	1 AP	29 3x	1. move (deduc.): in the samples	1 AP

				2. move (celeb.): in the paper 3. move (deduc.): in chocolate	1 AP 1 Postm.
12 2x	1. move (celeb.) at the University … 2. move (celeb.)	1 Postm. 0	30 3x	1. move (deduc.): 2. move (celeb.): in the system´ s evolution… 3. move (deduc.): into the stars	 1 Postm. 1 AP
13 3x	1. move (deduc.): 2. move (celeb.): 3. move (celeb.):	0 0 0	31 2x	1. move (deduc.): 2. move (deduc.):	0 0
14 2x	1. move (celeb.) 2. move (deduc.)	0 0	32 2x	1. move (deduc.): on each of the 3 lower extremity joints… 2. move (celeb.): on knee joint torque	1 AP 1 Postm.
15 2x	1. move (deduc.): in the forest scenario 2. move (celeb.):	1 AP 0	33 3x	1. move (deduc.): in the scallops 2. move (celeb.): 3. move (deduc.)	1 postm. 0 0
16 2x	1. move (deduc.): further from the center of gravity 2. move (celeb.): at the university of …; in the air	1 AP 1 Postm.	34 4x	1. move (deduc.): in nine women… in four others 2. move (deduc.) into a cell´ s genetic material…, 3. move (deduc.): 4. move (deduc.): from the vaccine in the new study	AP AP 0 1 Postm.
17	(celeb.)	0	35 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc.):	0 0 0
18 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc.): on the skin	0 0 1 AP			

the overall number: 82 **1/3 = 27**

locative expressions: 44x = grammatical feature

Table 9.5: contrastive conjunctions

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1 4x	1. move (celeb.): 2. move (deduc.): 3. move (celeb.): 4. move (celeb.):	0 0 0 0	19 3x	1. move (celeb.): 2. move (celeb.): but 3. move (deduc.): but	0 1 1
2	celeb.	0	20	(deduc.):	0
3 3x	1. move (celeb).: 2. move (deduc.): however 3. move (deduc.): however	0 1 1	21 3x	1. move (celeb.) but 2. move (deduc.): but 3. move (deduc.):	1 1 0
4 2x	1. move (deduc.): 2. move (celeb.):	1 0	22 3x	1. move (celeb.): but 2. move (deduc.): but 3. move (deduc.):	1 1 0

5 2x	1. move (deduc.): 2. move (celeb.):	0 0	23 2x	1. move (celeb.): 2. move (deduc.): although	0 1
6 2x	1. move (deduction): 2. move (celebr.):	0 0	24	(celeb.)	0
7 6x	1. move (deduc.): 2. move (celeb.): 3. move (celeb.): but 4. move (deduc.): 5. move (celeb.): 6. move (deduc.):	0 0 1 0 0 0	25 2x	1. move (celeb.): 2. move (deduc.):	0 0
8 2x	1. move (celeb.): but, 2. move (deduc.): although	1 1	26 2x	1. move (deduc.): 2. move (celeb.): however	0 1
9	(celeb.): but	1	27 3x	1. move (deduc.): 2. move (celeb.): 3. move (celeb.):	0 0 0
10 2x	1. move (deduc.): 2. move (celebr.): but	0 1	28	(deduc). although	1
11	(celeb.):	0	29 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc.):	0 0 0
12 2x	1. move (celeb.): 2. move (celeb.): but	0 1	30 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc.):	0 0 0
13 3x	1. move (deduc.): 2. move (celeb.): 3. move (celeb.):	0 0 0	31 2x	1. move (deduc.): 2. move (deduc.):	0 0
14 2x	1. move (celeb.): but 2. move (deduc.):	1 0	32 2x	1. move (deduc.): 2. move (celeb.):	0 0
15 2x	1. move (deduc.): but 2. move (celeb.):but	1 1	33 3x	1. move (deduc.): but 2. move (celeb.): but 3. move (deduc.):	1 1 0
16 2x	1. move (deduc.): 2. move (celeb.):	0 0	34 4x	1. move (deduc.): but 2. move (deduc.): but 3. move (deduc.): however 4. move (deduc.):	1 1 1 0
17	(celeb.)	0	35 3x	1. move (deduc.): but 2. move (celeb.): 3. move (deduc.):	1 0 0
18 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc	0 0 0			

the overall number: 82 **1/3 = 27**

contrastive conjunctions: 27x = grammatical feature

Table 9.6: direct speech

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1 4x	1. move (celeb.): Lovejoy said 2. move (deduc.): 3. move (celeb.): said team member 4. move (celeb.): Samuel said	1 0 1 1	19 3x	1. move (celeb.): 2. move (celeb.): 3. move (deduc.): Inokuchi says	0 0 1

2	celeb. Udry said	1	20	(deduc.): says Ann	1
3 3x	1. move (celeb).: 2. move (deduc.): 3. move (deduc.):	0 0 0	21 3x	1. move (celeb.) : 2. move (deduc.): direct speech 3. move (deduc.):	0 1 0
4 2x	1. move (deduc.): 2. move (celeb.):	0 0	22 3x	1. move (celeb.): says Sapkota 2. move (deduc.): 3. move (deduc.):	1 0 0
5 2x	1. move (deduc.): 2. move (celeb.): says Singleton	0 1	23 2x	1. move (celeb.): says Sullivan 2. move (deduc.): stresses Sullivan	1 1
6 2x	1. move (deduction): Bernhard said 2. move (celebr.):	1 0	24	(Celeb.)**:** said Scahill	0
7 6x	1. move (deduc.): 2. move (celeb.): said Alan 3. move (celeb.): 4. move (deduc.): Norell said 5. move (celeb.): 6. move (deduc.):	0 1 1 0 0	25 2x	1. move (celeb.): group suggests 2. move (deduc.):	1 0
8 2x	1. move (celeb.): 2. move (deduc.)	0 0	26 2x	1. move (deduc.): said Lebel 2. move (celeb.): said Lebel	1 1
9	(celeb.) said Gregory	1	27 3x	1. move (deduc.): 2. move (celeb.): 3. move (celeb.):	0 0 0
10 2x	1. move (deduc.): 2. move (celebr.):	0 0	28	(deduc.)	0
11	(celeb.)	0	29 3x	1. move (deduc.): the researchers wrote 2. move (celeb.): 3. move (deduc.):	1 0 0
12 2x	1. move (celeb.) she says 2. move (celeb.) says	1 1	30 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc.):	0 0 0
13 3x	1. move (deduc.): direct speech 2. move (celeb.): 3. move (celeb.)	**1** **0** **0**	31 2x	1. move (deduc.): 2. move (deduc.):	0 0
14 2x	1. move (celeb.) says Langely 2. move (deduc.) says Donnan	1 1	32 2x	1. move (deduc.): co-investigator state 2. move (celeb.):	1 0
15 2x	1. move (deduc.): says Golomb 2. move (celeb.): she says	1 1	33 3x	1. move (deduc.): says Tamura 2. move (celeb.): 3. move (deduc.)	1 0 0
16	1. move (deduc.): they	1	34	1. move (deduc.):	0

2x	write 2. move (celeb.): says Benton	 1	4x	2. move (deduc.) 3. move (deduc.): 4. move (deduc.):	0 0 0
17	(celeb.) says Linhard	1	35 3x	1. move (deduc.): professor said 2. move (celeb.): 3. move (deduc.): professor said	1 0 1
18 3x	1. move (deduc.): 2. move (celeb.): 3. move (deduc.):	0 0 0			

the overall number: 82 **1/3 = 27**

direct speech: 33x = grammatical feature

Table 9.7: Defined grammatical features in Move 7

Grammatical feature	Number of occurrences
Simple present tense	73x
Past simple	51x
Locative expressions	44x
That-clauses	42x
Relative clauses: finite, non-finite	37x
Passive structure and condensed passive	35x
Direct quotation	33x
Contrastive conjunctions	27x

The occurrence of grammatical features: Move 8

Table 10: present simple, **modal verbs marking possibility and ability**

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1	is unexpected, is	1 / **0**	19	**may aid**, is, gets, represents, *will chip away*	1 / **1**
2	no Move 8	0 / 0	20	need, says, like, is, **can become**, recognize	1 / **1**
3	**can not be applied, can be used**	1 / **1**	21	plans, assess, use, suggest	1 / **0**
4	obtain, *has identified* , **can reverse**, identifies, promises	1 / **1**	22	have shown, is loaded, will conduct	1 / **0**
5	hope, *will provide*,	1 / **0**	23	no Move 8	
6	don´t think, **can tell**, are interested in	1 / **1**	24	is expecting, **can be** reduced, starts, **may look** for, **can be used**	1 / **1**
7	*is helping*, *was not involved, is building,* are linked	1 / **0**	25	no Move 8	
8	have, seem, used, interfere	1 / **0**	26	**may lead**	1 / **1**
9	no Move 8		27	is, are tailored, don´t have, says	1 / **0**
10	answers, generates, is, *will take*, occur, happen	1 / **0**	28	*are trying*, possesses	1 / **0**

11	emphasize	1 / **0**	29	no Move 8	
12	says, is, says, is, does not start, **may look**, do, eat,cry, *are warming up*	1 / **1**	30	is, **may provide**	1 / **1**
13	*will be put*	0 / **0**	31	want to*, are resulting, are giving up*, recommend, seems, is	1 / **0**
14 2x	1. move: *would make it* 2. move: *are testing*, work, aim, **can understand**, lead,	1 / **0** 1 / **1**	32		0 / **0**
15	propose, **could offer**, says, **could be possible**, is, *would increase*	1 / **1**	33	no Move 8	
16	no Move 8		34	*will be*, says, gets, *is working*	1 / **0**
17	use, are made, **could reduce**	1 / **1**	35 2x	1. move: **could have,** *would be*, 2. move: consider, *are rising*, is needed	0 / **1** 1 / **0**
18	*is working*, allows	1 / **0**			

the overall number of moves: 30 **1/3 = 10**
present simple: 27x = grammatical feature
modal verbs: 13x = grammatical feature

Table 10.1: short passive structure

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1	is unexpected,	1	19		0
2	no Move 8	0	20		0
3	can not be applied, can be used	1	21		0
4		0	22	is loaded,	1
5		0	23	no Move 8	0
6		0	24	can be reduced, can be used	1
7	was not involved, are linked	1	25	no Move 8	0
8	should be used, should be made	1	26		0
9	no Move 8	0	27	are tailored,	1
10		0	28		0
11		0	29	no Move 8	0
12		0	30		0
13	will be put	1	31		0
14 2x	1. move: 2. move:	0 0	32		0
15		0	33	no Move 8	
16	no Move 8	0	34		0
17	are made	1	35 2x	1. move: 2. move: is needed	0 1
18		0			

the overall number of moves: 30 **1 / 3= 10**
passive structures: 11x = grammatical feature

Table 10.2: locative expressions: adverbials of place (AP), postmodifications by PP (Postm.)

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1	of biological anthropology at Pennsylvania State	1 Postm.	19	in the field of neurogenesis	1 AP
2	no Move 8		20	of the University of Western Sydney in Australia	1 Postm.
3		0	21	in the area	1 AP
4	in mice; in neurons; in sleep	1 AP	22	in tobacco-related disease	1 AP
5		0	23	no Move 8	
6		0	24	in children without medication	1 AP
7	on the mosaic	1 AP	25	no Move 8	
8	in television programmes	1 Postm.	26		0
9	no Move 8	0	27		0
10	in the brain	1 AP	28		0
11	from other language backgrounds	1 Postm.	29	no Move 8	
12		0	30		0
13	on display; at the Transvaal Museum…	1 AP 1 Postm.	31	in mind	1 AP
14 2x		0	32		0
15		0	33	no Move 8	
16	no Move 8		34	in women with precancerous …	1 AP
17		0	35 2x	1. move: 2. move:	0 0
18	from the University of California	1 Postm.			

the overall number of moves: 30 **1/3 = 10**
locative expressions: 16x = grammatical feature

Table 10.3: direct speech

article	Grammatical feature	occurrence	article	Grammatical feature	occurrence
1	Said Alan	1	19	Frankland adds	1
2	no Move 8		20	says psycholinguist	1
3		0	21		0
4	Abel said	1	22	Sapkota said	1
5	Says Sigleton (M7)	1	23	no Move 8	
6	Bernard told	1	24	Scahill said	1
7	Said Xu	1	25	no Move 8	
8		0	26	said Lebel	1
9	no Move 8		27	says Marsden	1
10	Sahin told	1	28		
11	concluded Dr. Wang	1	29	no Move 8	
12	Wermkle says	1	30		
13		0	31		
14 2x	1. move: says Donnan (M7) 2. move: he says	1 1	32	Dr. Kerrigan concludes	1
15		0	33	no Move 8	
16	no Move 8		34	Kenter says	1

17		0	35 2x	1. move: direct seech 2. move: Norman said (M3)	1 1
18		0			

the overall number of moves: 30 **1/3 = 10**
direct speech: 20x = grammatical feature

Table 10.4: Defined grammatical features in Move 8

Grammatical feature	Number of occurrences
Simple present tense	27x
Direct quotation	20x
Locative expressions	16x
Modal verbs marking ability and possibility	13x
Short passive	11x

Appendix n.2: Data sources

number1

M2 Oldest human skeleton offers new clues to evolution By Azadeh Ansari
CNN (CNN) -- The oldest-known hominid skeleton was a 4-foot-tall female who walked upright more than 4 million years ago and offers new clues to how humans may have evolved, scientists say.
M5 Scientists believe that the fossilized remains, which were discovered in 1994 in Ethiopia and studied for years by an international team of researchers, support beliefs that humans and chimpanzees evolved separately from a common ancestor.
"This is not an ordinary fossil. It's not a chimp. It's not a human. It shows us what we used to be," said project co-director Tim White, a paleontologist at the University of California, Berkeley.
Ardipithecus ramidus, nicknamed "Ardi," is a hominid species that lived 4.4 million years ago in what is now Aramis, Ethiopia. That makes Ardi more than a million years older than the celebrated Lucy, the partial ape-human skeleton found in Africa in 1974.
Ardi's 125-piece skeleton includes the skull, teeth, pelvis, hands and feet bones. ***M7C.*** Scientists say the data collected from Ardi's bone fragments over the past 17 years push back the story of human evolution further than previously believed.
"In fact, what Ardipithecus tells us is that we as humans have been evolving to what we are today for at least 6 million years," C. Owen Lovejoy, an evolutionary biologist at Kent State University and project anatomist, said Thursday.
Analysis of Ardi's skeleton reveals that she weighed about 110 pounds, had very long arms and fingers, and possessed an opposable big toe that would have helped her grasp branches while moving through trees.
Ardi's brain was believed to be the size of a chimp's, but she also had many human-like features, such as the ability to walk upright on two legs. Her "all-purpose type" teeth indicate that she probably ate a combination of plants, fruits and small mammals, scientists say.

M8 "The anatomy behind this behavioral combination is very unexpected and is certain to cause considerable rethinking of not only our evolutionary past, but also that of our living relatives: the great apes," said Alan Walker, professor of biological anthropology at Pennsylvania State University.
M7 Many scientists hypothesize that humans took a different evolutionary trajectory from those of chimpanzees, bonobos and gorillas. Ardi's findings help challenge earlier beliefs that humans evolved from chimpanzees, their closest genetic relatives, scientists say.
M3 l.c.Researchers are still trying to pinpoint when the two lineages -- chimps and humans -- split from their common ancestor.
M3 p.s. Digging up the past has not been easy.
Scientists stumbled upon the Ardipithecus fossil in 1994 when a graduate student found a single upper molar tooth. The rest of Ardi's fossilized bones, sandwiched between layers of volcanic rock, took three years to be recovered and many more to be analyzed.
M6 "In many ways, the discovery of Ardipithecus has been like a marathon," White said.
M7 "Ardipithecus ramidus and its prevailing anatomy revolutionize the way most of us understood the earlier part of our evolutionary history," said team member Yohannes Haile-Selassie, paleontologist at the Cleveland Museum of Natural History.
M4 The Ardi findings are the work of 47 paleontologists and geologists representing 10 countries. The results will be published Friday in 11 articles in a special edition of the journal Science.
M3 lim.Until now, Australopithecus, nicknamed "Lucy," was the oldest fossil studied by scientists seeking to explain human evolution. Lucy is believed to have lived about 3.2 million years ago in what is now Ethiopia.
M4 Many scientists credit Ethiopia with taking the lead in helping the world better understand the origins of humans.

M7C "This finding points to a deeper sense of our [humans'] interconnectedness," Samuel Assefa, Ethiopian ambassador to the United States, said Thursday. "We are all Ethiopians at heart."Ardi's skeleton resides in the National Museum of Ethiopia in Addis Ababa.

SFGate.com

Europeans find 32 new planets outside solar system

By SETH BORENSTEIN, AP Science Writer
Monday, October 19, 2009
(10-19) 17:46 PDT WASHINGTON, (AP) --

M2European astronomers have found 32 new planets outside our solar system, adding evidence to the theory that the universe has many places where life could develop. ***M5*** Scientists using the European Southern Observatory telescope didn't find any planets quite the size of Earth or any that seemed habitable or even unusual. But their announcement increased the number of planets discovered outside the solar system to more than 400.

Six of the newly found planets are several times bigger than Earth, increasing the population of so-called super-Earths by more than 30 percent. Most planets discovered so far are far bigger, Jupiter-sized or even larger.

Two of the newly discovered planets were as small as five times the size of Earth and one was up to five times larger than Jupiter.

M7 C Astronomer Stephane Udry of the University of Geneva said the results support the theory that planet formation is common, especially around the most common types of stars.

"I'm pretty confident that there are Earth-like planets everywhere," Udry said in a Web-based news briefing from a conference in Portugal. "Nature doesn't like a vacuum. If there is space to put a planet there, there will be a planet there."

What astronomers said is especially exciting is that about 40 percent of sun-like stars have planets that are closer to being Earth-sized than the size of Jupiter. Jupiter's mass is more than 300 times that of Earth's.

Depending on definitions of the size of super-Earths, the discovery suggests that planets that have a mass similar to Earth's are "extraordinarily commonplace," said Alan Boss, an astronomer at the Carnegie Institution of Washington. He was not part of the European team. "The universe must indeed be crowded with habitable worlds."

Boss said finding 32 planets at once is a record "and it really shows that the Europeans have taken the lead" in finding planets outside the solar system.

M6 The discoveries were made by the High Accuracy Radial Velocity Planet Searcher, which is an attachment to the European observatory telescope in Chile that looks for slight wobbles in a star's movements. Those changes would be made by the tug of a planet's gravity on the star. There are no photos of these planets.

number 3

Mice Cloned In Spain

M2 ScienceDaily (June 12, 2009) — Researchers at the Department of Cell Biology, Physiology and Immunology at Universitat Autònoma de Barcelona (UAB) are the first to have cloned mice in Spain. Cloe, Cleo and Clona are three female brown-coloured mice and were born respectively on 12 May, 3 June and 10 June. ***M6*** By means of nuclear transfer techniques, scientist collected mature oocytes, removed their chromosomes and substituted them for the nucleus of an adult somatic cell. ***M4***The cloning of mice is part of a research being carried out to study new ways to improve the efficiency of the cloning process.
M5 All three mice were or are being suckled with other non-clones and their growth parameters are within normal range, say researchers who were in charge of cloning the mice, Nuno Costa-Borges, Josep Santaló and Elena Ibáñez from the Department of Cell Biology, Physiology and Immunology at UAB.

M6 In order to clone the animals, researchers collected oocytes and surrounding cumulus cells from several female mice. The chromosomes were extracted from each of the oocytes and substituted with a cell from the cumulus by cytoplasm injection. Once the oocytes had been reconstructed, they were activated by simulating the stimuli occurring during fecundation so as to induce embryonic development. The cloned embryos were later transferred to receptor females.

M7 C.The mice obtained by researchers at UAB, in addition to being the first of their species cloned in Spain, are the first animals to survive at birth and develop correctly. In 2003, Spanish scientists were able to clone a female Pyrenean mountain goat using a cell from the last animal of this species, which became extinct in 2000. The cloned animal however died 10 minutes after it was born due to a severe lung defect.

Increase in the efficiency of the cloning process

M4 The cloning of the mice forms part of a research which scientists at UAB are carrying out to discover new ways of improving the efficiency of the cloning process. Nuno Costa-Borges, Josep Santaló and Elena Ibáñez are studying whether the use of valproic acid could contribute to an increase in the success rate of nuclear transfer cloning, currently situated at approximately 1% for mice using standard procedures.

M3 l.c.Valproic acid is an inhibitor of the enzyme histone deacetylase, located at the cell nucleus where the DNA is found. ***M7 D*** Research carried out until now has shown that histone deacetylase inhibitors seem to contribute to an increase in levels of gene expression, which would favour the reprogramming of the somatic cell nucleus transferred to the oocyte cytoplasm. Its use in nuclear transfer processes however is very recent. It was first used two years ago and research until now has focused on trichostatin, an inhibitor which has significantly improved the efficiency of mouse cloning, raising it to 5%.
M8 Studies carried out by researchers at UAB can not only be applied to reproductive cloning of animal models; they can also be used for the reprogramming of cells for therapeutic aims. ***M6*** Costa-Borges, Santaló and Ibáñez are comparing three groups of cloned embryos in their research: valproic acid in the first group, trichostatin in the second and no inhibiting substance in the third group. The three mice in this case were cloned using the first (Cloe and Clona) and second (Cleo) inhibitors.***M7D***In vitro experiments already pointed to improvements in the development of cloned embryos using inhibitors. ***M3 lim.ongo*** However, scientists must wait until the end of the in vivo test period in July to obtain more conclusive data.

number 4

Fighting Sleep: Researchers Reverse Cognitive Impairment Caused By Sleep Deprivation

M3 lim.ongo
Sleep deprivation can have cognitive consequences, including learning and memory deficits, but the mechanisms by which sleep deprivation affects brain function have remained unknown. (Credit: iStockphoto/Nicole Waring)

M2 ScienceDaily (Oct. 27, 2009) — A research collaboration led by biologists and neuroscientists at the University of Pennsylvania has found a molecular pathway in the brain that is the cause of cognitive impairment due to sleep deprivation. ***M5*** Just as important, the team believes that the cognitive deficits caused by sleep deprivation, such as an inability to focus, learn or memorize, may be reversible by reducing the concentration of a specific enzyme that builds up in the hippocampus of the brain.

M3 lim.ongo It is known that sleep deprivation can have cognitive consequences, including learning and memory deficits, but the mechanisms by which sleep deprivation affects brain function remain unknown. ***M4*** A particular challenge has been to develop approaches to reverse the impact of sleep deprivation on cognitive function.

The findings, reported in this week's issue of the journal *Nature*, could present a new approach to treating the memory and learning deficits of insomnia. A molecular mechanism by which brief sleep deprivation alters hippocampal function is now identified in mice, involving the impairment of cyclic-AMP- and protein-kinase-A-dependent forms of synaptic plasticity, or readiness for cognitive function.

M7 D Ted Abel, principal investigator and professor of biology in the School of Arts and Sciences at the University of Pennsylvania, led the international team of researchers that found that sleep deprivation in mice affects an important molecular pathway in the hippocampus, a region of the brain known to be important for memory and learning. The study showed that mice deprived of sleep had increased levels of the enzyme PDE4 and reduced levels of the molecule cAMP, the latter of which is crucial in forming new synaptic connections in the hippocampus, a physiological hallmark of learning.

M6 Researchers then treated the mice with PDE inhibitors, ***M7 C*** which rescued the sleep deprivation-induced deficits in cAMP signaling, synaptic plasticity and hippocampus dependent memory. This reversal also helped to rescue deficits in synaptic connections in the hippocampus and therefore counteract some of the memory consequences of sleep deprivation.

M8 "Millions of people regularly obtain insufficient sleep," Abel said. "Our work has identified a treatment in mice that can reverse the cognitive impact of sleep deprivation. Further, our work identifies specific molecular changes in neurons caused by sleep deprivation, and future work on this target protein promises to reveal novel therapeutic approaches to treat the cognitive deficits that accompany sleep disturbances seen in sleep apnea, Alzheimer's disease and schizophrenia."

Five genes linked to Parkinson's disease

Monday, 16 November 2009
Reuters

M2 People of Japanese and European descent who have mutant versions of five genes may be at higher risk of developing Parkinson's disease, two large teams of researchers have found.

M4 The two independent studies, published in the latest issue of *Nature Genetics*, involved a total of more than 25,000 participants, and are the largest studies to date to try to uncover genetic associations behind Parkinson's disease.

M6 A study in Japan looked only at ethnic Japanese while a second study, in the US, focused only on people of European heritage.

In the first study, Dr Tatsushi Toda of Japan's Kobe University and colleagues sequenced the genes of 2,011 participants with the disease and 18,381 others without the disease.

M5 They found that those with the disease had variants of the genes PARK16, BST1, SNCA and LRRK2.
M6 In the second study, researchers led by Dr Andrew Singleton at the National Institutes of Health's (NIH) laboratory of neurogenetics in the US analysed the genes of more than 5,000 patients of European ancestry who suffer from the disease and ***M5*** detected strong links between Parkinson's and variants of the genes SNCA and MAPT.

M7 D The two teams later compared their data and found that variants of PARK16, SNCA and LRRK2 carry risk of Parkinson's in both Japanese and European populations, while variants of BST1 and MAPT were population-specific.

M3 p.s.''Because previous Parkinson's genome-wide association studies were too small and lacked power, ***M6*** we worked together to compile and analyse the large data sets needed to identify the elusive genetic variations that play a role in this complex disease," says Singleton.

M3 l.c.Parkinson's is a neurodegenerative disease that affects one to 2% of people over the age of 65. It is characterised by tremors, sluggish movement, muscle stiffness, and difficulty with balance.

M3 lim.ongo Although medical treatments may improve symptoms, there are none that can slow down or halt the progression of the disease.

M7 C "With this better understanding of the underlying genetic variants involved in the progress of this disorder, we have more insight into the causes and underlying biology of this disease," says Singleton.

"We hope this new understanding will one day provide us with strategies to delay, or even prevent, the development of Parkinson's disease."

number 6

LIVE SCIENCE.

Evidence Alexander the Great Wasn't First at Alexandria

By Andrea Thompson, Senior Writer
posted: 23 October 2009 02:34 pm ET

M1Alexander the Great has long been credited with being the first to settle the area along Egypt's coast that became the great port city of Alexandria. ***M2*** But in recent years, evidence has been mounting that other groups of people were there first. ***M6*** The latest clues that settlements existed in the area for several hundred years before Alexander the Great come from microscopic bits of pollen and charcoal in ancient sediment layers.

M3 l.c. Alexandria was founded by Alexander the Great in 331 B.C. The city sits on the Mediterranean coast at the western edge of the Nile delta. Its location made it a major port city in ancient times; it was also famous for its lighthouse (one of the Seven Wonders of the Ancient World) and its library, the largest in the ancient world.
M5 But in the past few years, scientists have found fragments of ceramics and traces of lead in sediments in the area that predate Alexander's arrival by several hundred years, suggesting there was already a settlement in the area (though one far smaller than what Alexandria became).

M6 Christopher Bernhardt of the U.S. Geological Survey and his colleagues took sediment cores (long cylindrical pieces of sediment drilled from the ground) that featured layers going as far back as nearly 8,000 years ago as part of a larger climate study of the area.
In these sediment layers, Bernhardt and his colleagues took samples of embedded ancient pollen grains to look for shifts from primarily native plants to those associated with agriculture. They also analyzed levels of microscopic charcoal, whose presence can indicate human fires.

M7D At a mark of 3,000 years ago, Bernhardt's team detected a shift in pollen grains from native grasses and other plants to those from cereal grains, grapes and weeds associated with agriculture. They also found a marked increase in charcoal particles, all of which suggests that a settlement pre-dated the great city of Alexandria.
"They're definitely using the landscape," Bernhardt said.

M7 C Interestingly, this idea is also supported in the stories of Homer: In Book 4 of "The Odyssey," there's a mention of a one-day sail from the coast near the Nile to the nearby island of Pharos. This suggests that a port settlement of some sort was already there, the researchers say.

New "Mini" Dinosaur a Step in Bird Evolution Path number 7

Kevin Holden Plattfor National Geographic News

September 6, 2007

M2 An 80-million-year-old fossil recently uncovered in the Gobi desert could be a key piece of the evolutionary puzzle of how massive dinosaurs gave rise to today's comparatively tiny birds, paleontologists say.
M5 he newfound species, dubbed *Mahakala omnogovae,* measures just 27.5 inches (70 centimeters) from its head to the tip of its feathered tail.
Dinosaur digs over the last decade—including many in China—have suggested that several of the ancient reptiles were covered in feathers, a hint of their potential link to birds.
(Related: "Massive Birdlike Dinosaur Unearthed in China" [June 13, 2007].)
But few of the fossils have provided direct evidence of the evolutionary changes that led to flight.
M7D *Mahakala*'s small size bolsters the idea that some theropods, or bipedal carnivorous dinosaurs, decreased in stature during the evolutionary transition into birds, according to the team of paleontologists who discovered the young adult fossil.
M7C"Miniaturization has long been considered crucial to the origin of flight," said Alan Turner of New York's American Museum of Natural History.
"Now *Mahakala* is providing the first signs of some of these early evolutionary steps."
M4Turner and colleagues will present their findings in tomorrow's issue of the journal *Science.*

Tiny Protector

M3 The *Mahakala* fossil was found in the southern part of the Gobi in Mongolia and was named after a Tibetan Buddhist protector deity.
M6 Paleontologists reconstructed *Mahakala* based on fossilized portions of the dinosaur's skull and limbs along with most of its spinal column.
M7C The fossils indicate that the new species was not only feathered but also likely had winglike forelimbs and hind limbs, Turner said.
M3 l.c. Mark Norell is a study co-author and curator at the natural history museum's division of paleontology.
M7 D "Many of the animals that were thought to look like giant lizards only a few years ago are now known to have been feathered and to have had many other defining bird characteristics," Norell said.
M3 l.c. *Mahakala* is an offshoot of the group of meat-eating dinosaurs known as dromaeosaurids, which includes the *Velociraptor* featured in the 1993 movie *Jurassic Park.*
If Steven Spielberg were to make another *Jurassic Park* sequel, Turner noted, many of the dinosaurs that starred in the original film would require a complete makeover.
"The *Velociraptor* would be completely covered in feathers," he said.

Bird Survival

M7 C Xu Xing, one of China's leading dinosaur hunters and an expert on the evolution of feathered dinosaurs, said that the new find fits perfectly into the theory that dinos evolved into birds.
M8 "The discovery of *Mahakala* and other small birdlike dinosaurs is helping paleontologists paint new details on the mosaic depicting the first flight-capable birds' ascent from nonavian dinosaurs," said Xu, who was not involved in the new study.
Today consensus is building among paleontologists that dinosaurs and birds are linked.
M3 lim.ongo But the experts disagree over how that evolutionary twist helped ancient birds escape being wiped out with the rest of the dinosaurs 65 million years ago.
"Paleontologists really don't know the answer to that. Why some animals survive mass extinctions while others don't is one of the most difficult questions in paleontology," lead study author Turner said.
"Flying doesn't seem to have hurt birds, yet pterosaurs—which are not dinosaurs—flew but went extinct."
M7 D Xu added that a combination of birds' ability to fly and to evolve quickly might have helped them survive.
M3 l.c."Birds mature within one year, and that gives them the means to adapt very rapidly to big changes in the environment," he said.

"They evolve much more quickly than massive dinosaurs or human

number 8

Science News

Foreign Subtitles Improve Speech Perception

M1 *ScienceDaily (Nov. 11, 2009)* — Do you speak English as a second language well, but still have trouble understanding movies with unfamiliar accents, such as Brad Pitt's southern accent in Quentin Tarantino's Inglourious Basterds? ***M4*** In a new study, published in the open-access journal *PLoS One,* Holger Mitterer (Max Planck Institute for Psycholinguistics) and James McQueen (MPI and Radboud University Nijmegen) show how you can improve your second-language listening ability by watching the movie with subtitles -- as long as these subtitles are in the same language as the film. Subtitles in one's native language, the default in some European countries, may actually be counter-productive to learning to understand foreign speech.

M5 Mitterer and McQueen show that listeners can tune in to an unfamiliar regional accent in a foreign language. Dutch students showed improvements in their ability to recognise Scottish or Australian English after only 25 minutes of exposure to video material. English subtitling during exposure enhanced this learning effect; Dutch subtitling reduced it.

M6 In the study, Dutch students who were unfamiliar with Scottish and Australian English watched either an episode of the Australian sitcom Kath & Kim or a shortened version of Trainspotting, which depicts a Scottish drug addict, Renton, and his friends -- with English subtitles, Dutch subtitles or no subtitles. After this exposure, participants were asked to repeat back as many words as they could from 80 audio excerpts taken from each source spoken by the main characters (Kath from Kath & Kim; Renton from Trainspotting), half of which had already been heard by the participants in the extracts and half were new to the participants (from a different Kath & Kim episode or from a part of Trainspotting that was edited out).

M7 C The researchers found that English subtitles were associated with the best performance on both previously heard and new material but although Dutch subtitles also enhanced performance on the old items, they led to a worse performance on the new materials. The participants seemed to be using the semantic (meaning-based) information in the Dutch subtitles when listening to the English speech and so the Dutch subtitles appear to have helped the participants to decipher which English words had been uttered, as seen in the improved recognition of previously heard materials. ***M3 lim.ongo*** This did not, however, allow participants to retune their phonetic categories so as to improve their understanding of new utterances from the same speaker.

M7 D Listeners can use their knowledge about how words normally sound to adjust the way they perceive speech that is spoken in an unfamiliar way. This seems to happen with subtitles too. If an English word was spoken with a Scottish accent, English subtitles usually told the perceiver what that word was, and hence what its sounds were. This made it easier for the students to tune in to the accent. In contrast, the Dutch subtitles did not provide this teaching function, and, because they told the viewer what the characters in the film meant to say, the Dutch subtitles may have drawn the students' attention away from the unfamiliar speech.

M8 These findings also have educational implications. Since foreign subtitles seem to help with adaptation to foreign speech in adults, they should perhaps be used whenever available (e.g. on a DVD) to boost listening skills during second-language learning. Moreover, since native-language subtitles interfere with this kind of learning, such subtitles in television programmes should be made optional for the viewer.

This work was funded by the Max-Planck-Gesellschaft zur Förderung der Wissenschaften.

number 9

August 28, 2007
Baby Talk Crosses Cultural Line

By NICHOLAS BAKALAR

M1 It may be that when adults talk to babies, they use a language that is universally understood.

M6 Researchers made recordings of English-speaking mothers talking to babies and to adults, then played them to residents of a Shuar village in Morona Santiago Province in southeastern Ecuador. ***M4*** The Shuar are an indigenous group of hunter-horticulturalists who had been taught Spanish but have their own language, and the scientists wanted to see if they could understand the meaning, even without understanding any of the words, when adults talked to babies in English.

M6 The researchers recorded four utterances from each of eight English-speaking mothers, ages 21 to 51. The mothers viewed pictures of babies to provoke speech suggesting one of four categories of meaning: prohibition, approval, comfort or paying attention. They were given no script, but were asked to speak as if they were talking to their own baby, using the same phrasing and intonation.
Then the women were recorded conveying the same meanings as if speaking to an adult.

M5 The 26 Shuar young adults were successful about three-quarters of the time in determining whether an adult or a child was being addressed. With adult speech, they identified the correct meaning category 64 percent of the time, with only moderate success in identifying attention and comfort, and very little in understanding prohibition and approval.

But when English-speaking adults talked to babies, the Shuar found it much easier to understand. They succeeded an average of 75 percent of the time in distinguishing the four meanings, with success rates of 78 percent in identifying attention and 86 percent in understanding prohibition. ***M4*** The report appears in the August issue of Psychological Science.

M7 C"This is the first empirical demonstration that in a nonliterate, nonindustrialized indigenous culture, people are able to recognize meaning in a language they don't speak," said Gregory A. Bryant, a co-author of the paper and an assistant professor of communications at the University of California, Los Angeles. "There is variability across cultures in how much people talk to babies, but when they do, they tend to sound very much alike."

Speed of Thought-to-Speech Traced in BrainBy Andrea Thompson number 10 posted: 15 October 2009 02:06 pm ET

M1 In just 600 milliseconds, the human brain can think of a word, apply the rules of grammar to it and send it to the mouth to be spoken. ***M2*** For the first time, researchers have traced this lightning-fast sequence and broken it down into distinct steps.

M6 Researchers got this rare glimpse into the fine-tuned workings of the brain from the signals sent by electrodes implanted in the brains of epileptics. ***M5*** The electrodes help surgeons locate the parts of the brain that cause epileptic seizures so they can be removed, and also help keep surgeons from removing critical parts of the brain

"If you go a few millimeters to the right or left, you might delete their piano lessons or language ability, and that would be sorely missed," said Ned Sahin of Harvard University, one of the researchers who studied the language network.

M6 Because the electrodes are already monitoring language ability in these patients, Sahin and his colleagues can conduct simple language experiments with willing participants and see language processing in real time; essentially, the electrodes offer a more fine-grained look at neural processes than other traditional brain-monitoring technologies, such as MRIs.

The language center

M3 l.c. The main brain region Sahin and his colleagues looked at is called the Broca's area, located in the cerebral cortex. This region was discovered to be involved in language processing by the French physician Pierre Paul Broca in 1865.

M3 lim.onBut beyond knowing that the area is important to language production, "we still have been troublingly unable to pin it down," Sahin said. Whether or not the steps of the language production process happen in parallel or sequentially has been one particularly puzzling question about the brain.

M4 The new electrode study, detailed in the Oct. 16 issue of the journal Science, has set scientists one step closer to understanding the steps of language production in the brain, specifically word recall, the application of grammar (changing tense or number), and actually speaking the word.

M6 By monitoring the brains of three patients while they performed a simple language task (looking at a word, then either using it in a sentence as is or changing its tense or number, and finally articulating it silently), ***M7 D*** Sahin and his colleagues found three distinct periods of activity in Broca's area at 200 milliseconds (after first being presented with the word), 320 milliseconds and 450 milliseconds.

These three spikes corresponded to the three basic components of language: words, grammar and phonology (the organization of sound). All three also fit within the roughly 600 milliseconds required for the onset of speech.

Distinct steps

The finding shows that Broca's area is involved in all three of these language production steps and shows that they happen at distinct points in time, not all at once in parallel, Sahin said.

M8 While the research answers some questions about how the brain generates language, "this is just one piece in the puzzle," Sahin told LiveScience. It will take more study to further detail all the points of language in the brain: when they occur and what parts of the brain they happen in.

M7 C But the finding "may be the nail in the coffin" for one persistent, though long-discredited theory that Broca's area processes the speech part of language, while another area of the brain, called the Werneke's area, processes reading and learning words.

"It's not so simple as Broca's speaks and Werneke's listens," Sahin said.

Funding for the study came from the National Institutes of Health, the Mental Illness and Neuroscience Discovery Institute at Harvard, the Weill Medical College of Cornell University and the Harvard Mind/Brain/Behavior Initiative.

Science News

M2 **Tai Chi Exercise Reduces Knee Osteoarthritis Pain In The Elderly, Research Shows**
ScienceDaily (Nov. 1, 2009) — Researchers from Tufts University School of Medicine have determined that patients over 65 years of age with knee osteoarthritis (OA) who engage in regular Tai Chi exercise improve physical function and experience less pain. ***M1*** Tai Chi (Chuan) is a traditional style of Chinese martial arts that features slow, rhythmic movements to induce mental relaxation and enhance balance, strength, flexibility, and self-efficacy.

M4 Full findings of the study are published in the November issue of *Arthritis Care & Research*, a journal of the American College of Rheumatology.

M3 l.c. The elderly population is at most risk for developing knee OA, which results in pain, functional limitations or disabilities and a reduced quality of life. According to the Centers for Disease Control and Prevention (CDC) there are 4.3 million U.S. adults over age 60 diagnosed with knee OA, a common form of arthritis that causes wearing of joint cartilage. ***M4*** A recent CDC report further explains that half of American adults may develop symptoms of OA in at least one knee by age 85.

M6 For this study, Chenchen Wang, M.D., M.Sc., and colleagues recruited 40 patients from the greater Boston area with confirmed knee OA who were in otherwise good health. The mean age of participants was 65 years with a mean body mass index of 30.0 kg/m2. Patients were randomly selected and 20 were asked to participate in 60-minute Yang style Tai Chi sessions twice weekly for 12 weeks. Each session included: a 10-minute self-massage and a review of Tai Chi principles; 30 minutes of Tai Chi movement; 10 minutes of breathing technique; and 10 minutes of relaxation.

M5 "Tai Chi is a mind-body approach that appears to be an applicable treatment for older adults with knee OA," said Dr. Wang. Physical components of Tai Chi are consistent with current exercise recommendations for OA, which include range of motion, flexibility, muscle conditioning, and aerobic work out. Researchers believe the mental feature of Tai Chi addresses negative effects of chronic pain by promoting psychological wellbeing, life satisfaction, and perceptions of health.

M6 The remaining 20 participants assigned to the control group attended two 60-minute class sessions per week for 12 weeks. Each control session included 40 minutes of instruction covering OA as a disease, diet and nutrition, therapies to treat OA, or physical and mental health education. The final 20 minutes consisted of stretching exercises involving the upper body, trunk, and lower body, with each stretch being held for 10-15 seconds.

M7 **C** At the end of the 12-week period, patients practicing Tai Chi exhibited a significant decrease in knee pain compared with those in the control group. Using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain scale, researchers noted a -118.80 reduction in pain from baseline between the Tai Chi and control group. Researchers also observed improved physical function, self-efficacy, depression, and health status for knee OA in subjects in the Tai Chi group. ***M8*** "Our observations emphasize a need to further evaluate the biologic mechanisms and approaches of Tai Chi to extend its benefits to a broader population," concluded Dr. Wang.

Science NOW UP TO THE MINUTE NEWS FROM SCIENCE

Don't Shush That Baby, It's Learning

by Helen Fields on November 5, 2009 12:00 AM |

M1 A newborn's cry is a call to action. "Quick, somebody help me!" But bawling babies are getting something else besides attention: language practice. ***M2*** A new study finds that, in the first few days of life, babies produce cries that mimic the melodies of their native language.

M3 l.c. By the time a baby is born, it's been learning about the outside world for a long time. In the last 3 months of gestation, a fetus's ears have developed enough to pick up sounds, including its mother's voice. This may explain why newborns--babies up to 1 month old--already seem to prefer being talked to in their native tongue. By 4 months or so, babies have a lot of outside-the-womb experience--and a better-developed vocal tract. That's when they start babbling in their parent's language or languages. ***M3 lim. past*** But researchers didn't believe that babies could make native-language-specific sounds before this age.

M4 Behavioral scientist Kathleen Wermke of the University of Würzburg in Germany suspected otherwise. She's been studying babies' cries for 2 decades and has seen, for example, that children whose cries have more complex melodies and rhythms at 2 months of age have more developed language skills later. "I think cry melody is really the beginning of language development," Wermke says. Her new study backs that up.

M6 Wermke and colleagues analyzed digital recordings of cries from 30 German and 30 French babies who were between 2 and 5 days old. All of the crying was spontaneous; no babies were harmed in the making of this study. The researchers analyzed melody contour--whether the cries tended to rise from lower pitches to higher pitches or to fall from higher pitches to lower pitches.

M5 All of the infants tried out their vocal repertoire with a wide variety of cries, the scientists report online today in *Current Biology*. But French babies produced more cries with a rising contour, whereas German babies produced more falling cries. These melodies are typical of the speech patterns of their respective languages, the team reports.

M7C The findings indicate that newborn infants are already making sounds that are precursors to the sentences they'll be saying in a few years, says Wermke. That makes perfect sense, she says. "Why should a baby wait for 4, 5, 6 months before starting this language development?" ***M3 l.c.*** Wermke thinks babies learn the melody of the language in utero, although it's impossible to rule out that they're showing the results of very rapid learning since birth.

M7 C "My mouth was kind of hanging open as I was reading," says Janet Werker, a developmental psychologist at the University of British Columbia in Canada. Researchers knew that "[newborns] can hear the difference between things, they have a preference for their mother's voice, but to show that it's actually affecting their cry production is pretty stunning." She points out that it's particularly impressive that infants apparently have some control over their vocalizations, an ability some older studies suggested that newborns lacked.

M8 Wermke says the next step is to compare cries from other language backgrounds, like Chinese and Japanese. She would also like to look at hearing-impaired infants to see how their cries differ. She says the study is a reminder that language does not start with the first words, or even the first syllables. Newborn infants may look like tiny blobs who do nothing but sleep, eat, and cry, but they're already warming up for a lifetime of talking.

News in Science **number 13**

New species of dinosaur discovered

Thursday, 12 November 2009 Andrew Geoghegan for AM
ABC

M5 Artist's impression of a sauropod, which scientists believe Aardonyx evolved into*(Source: Laurie Beirne)*

M2 An Australian palaeontologist has unearthed the fossilised remains of a new species of dinosaur, which has prompted a re-think about dinosaur evolution.

M4 The discovery was made in South Africa **M8** and scientists think it may help explain how dinosaurs evolved from two-legged animals into the four-legged sauropods - the largest creatures to walk the earth.

M5 Scientists believe the nine-metre long *Aardonyx*, which roamed the earth about 195 million years ago at the dawn of the Jurassic period, died by a river in what is now the Free State in central South Africa.

M4 Palaeontologist Dr Adam Yates of the a University of Witwatersrand says scientists had no idea the plant-eating dinosaur existed until he and his team began digging 5 years ago and unearthed the animal's fossilised remains.

M5 "It was a pretty large dinosaur for its time," he says. "We have only found juvenile bones, but the largest individual at this site was probably in the vicinity of nine metres in length and two metres high at the hips."

Yates says *Aardonyx* would have been a fairly slow moving, heavy bodied animal.

"[It was] a big barrel-bellied animal with quite thick, solid, heavy hind legs and a rather short broad foot. ***M6*** We have a hand that had some sort of crude grasping ability, large claws on the end of the hands, and then a long, thin neck and quite a small head."

Early sauropod

M7 D *Aardonyx* is thought to have evolved into the giant sauropods; 40-metre long dinosaurs that weighed more than 100 tonnes.

M7 C Yates says the find is significant because *Aardonyx* is a transitional dinosaur, one that is caught between two basic body plans.

M3 l.c. "We have the very derived and specialised gigantic sauropods. These are the classic long-necked, small headed giant elephant limbed, four-footed plant eaters, things like the brontosaurus."

He says before the sauropods a group called the prosauropods roamed the planet.

They were bipedal instead of quadripedal, and much smaller than the sauropods, says Yates.

"*Aardonyx* is an animal that sits right in the middle of the transition between the two different types of dinosaur," he says. "It's like the animal that is on the very cusp of dropping down onto all fours and becoming a committed quadruped."

New insight

Yates says the find has changed our understanding of the nature of the evolution of the giant sauropods.

M7 C "It really is showing that certain features that we thought only evolved much later after they became committed quadripedal giants were actually present way back in this early stage, that is a new discovery."***M8*** The fossils will be put on display at the Transvaal Museum in the South African capital Pretoria.

number 14

News in Science

Enzyme blocker may reverse nerve damage

Tuesday, 27 October 2009 Branwen Morgan

ABC

M2 Blocking the action of a single enzyme prevents injured nerve cells dying and enables them to regrow, say scientists in the US.

M4 Their findings, to be published this week in the early edition of the *Proceedings of the National Academy of Science*, could have implications for sufferers of spinal injury and stroke, as well as neurodegenerative diseases such as Alzheimer's disease.

M3 l.c. The enzyme, called HDAC (histone deacetylase) belongs to a group known for their role in controlling gene expression - the creation of proteins based on DNA. Non-specific blocking of these enzymes causes most cells to die, but some nerve cells can survive.

M4 "We decided to try and find which of the HDACs could be selectively blocked to confer the neuroprotective effect without the unwanted toxicity", says Assistant Professor Brett Langley of the Weill Cornell Medical College in New York.

Process of elimination

M6 The researchers used rat nerve cells grown in culture and tested several non-specific HDAC inhibitors to assess their neuroprotective ability during oxidative stress. Oxidative stress occurs in injured nerve tissue and is due to inflammation or loss of blood flow to the region. It can result in the loss of nerve cells for up to several weeks after the initial trauma.

M5 The inhibitors worked despite the presence of substances produced by the injured nerve tissue known to prevent the nerve cells repairing by themselves.

During their experiments they made another interesting finding.

M7C "We were extremely surprised to find that inhibiting a subset of HDACs not only promotes survival of cultured nerve cells but causes them to regenerate," says Langley.

They eventually narrowed the list of HDACs to one key suspect: HDAC6, and designed drugs that would only block this enzyme.

"What's also nice about this discovery is that we believe the enzyme blockers act directly at the trauma site, which is important because nerves can be extremely long and the trauma can disrupt signaling," says Langley.

Protect and repair

M7 D Professor Geoffrey Donnan, Director of the Florey Neuroscience Institutes, says these findings are worthy of attention.

"The main advantage is the dual benefit obtained by blocking HDAC6," says Donnan. "The results also suggest that therapeutic benefits may be seen even if the enzyme blockers are applied well after the initial onset of symptoms. ***M8*** This would make it a viable treatment option for a range of neurodegenerative disorders as well as for stroke and spinal injury."

M3 lim.ongo But Donnan notes that many promising strategies have failed to move from the laboratory to the clinic.

Langley agrees.

M8 "We are now testing how well the HDAC6 inhibitors work in vivo. At the same time we aim to uncover all the enzyme's targets so we can better understand the mechanisms that lead to its ability to protect neurons and promote their regrowth," he says.

number 15

The world looks different if you're depressed

M1 DEPRESSION really does change the way you see the world. ***M2*** People with the condition find it easy to interpret large images or scenes, but struggle to "spot the difference" in fine detail. The finding hints at visual training as a possible treatment.

M3 Depressed people have a shortage of a neurotransmitter called GABA; this has also been linked to a visual skill called spatial suppression, which helps us suppress details surrounding the object our eyes are focused on - enabling us to pick out a snake in fallen leaves, for instance.

M4 Now Julie Golomb and colleagues at Yale University are trying to link this ability with major depressive disorder (MDD). ***M6*** Golomb asked 32 people to watch a brief computer animation of white bars drifting over a grey and black background, and say which way they were moving. ***M5*** A quicker response gave a higher score. Half of the group had good mental health, while the rest had recently recovered from depression. The latter were chosen so that medication would not interfere with the results, but Golomb thinks results from people with MDD would be similar because the condition is thought to have genetic factors.

M7 D When the image was large, the recovered volunteers found the task easier, which means they would do better in the forest scenario. But they performed less well than the other group when looking at a small image. "Their ability to discriminate fine details was impaired, which is the sort of perception that we tend to use on a daily basis," says Golomb (*Journal of Neuroscience*, DOI: 10.1523/jneurosci.1003-09.2009).

M7 C"Depression is often thought of as just a mood disorder," she says, "but it can impact upon eating and sleeping habits, and now we know it can even affect the way a person sees the world."

Depression is not just a mood disorder: now we know it can affect the way a person sees the world

M8 In a commentary on the study, Pascal Wallisch and Romesh Kumbhani of New York University propose that perception training could offer a therapy for people with MDD. Golomb says this could be possible, but it's unclear if training would increase levels of GABA.

Early birds may have dropped teeth to get airborne

Holotype of Zhongjianornis yangi gen. et sp. nov. (Image: Zhonghe Zhou and Fucheng Zhang Zhiheng Li)
M1 Fad dieting wasn't an option in the Cretaceous, so the earliest birds went to more extreme measures to address weight issues: they lost their teeth.

M3 l.c. *Archaeopteryx*, at 150 million years old still the oldest known bird, had an imposing set of teeth. But within 20 million years, at least some birds were toothless. ***M2*** Now a team led by Zhonghe Zhou at the Chinese Academy of Sciences in Beijing believe they know why.

M5 They discovered *Zhongjianornis yangi*, a toothless bird from 122 million years ago in China's Liaoning province. Their analysis shows that *Z. yangi* belonged to one of four bird groups that independently lost their teeth, implying that this loss was no evolutionary fluke. *Z. yangi*'s group is the most primitive among them, suggesting it could provide clues as to why tooth loss occurred.

M6 The team compared the body structure of a number of early birds ***M7D*** and found that some toothed species were more adapted for flight. They think natural selection may have put pressure on weaker fliers to lose their teeth in a bid to improve their skills by losing excess weight. "It would be especially advantageous to reduce the weight of the head because [it] is further from the centre of gravity," they write.

M7C That theory is "as good as any other", says Mike Benton at the University of Bristol, UK, though he remains sceptical. "Losing teeth wouldn't make a huge difference to balance in the air."
Journal reference: *Proceedings of the Royal Society B*, DOI: 10.1098/rspb.2009.0885

number 17

A Battery Made With Paper

by Robert F. Service on December 8, 2009 12:00 AM

M1 Paper has been getting beat by electronics for years. But it may be about to stage a comeback. ***M2*** Researchers are reporting that they've made batteries and other energy-storage devices by printing layers of carbon nanotube–based ink atop standard photocopy paper. ***M5*** The result is a highly conductive sheet that can carry a charge and be easily incorporated into a flexible battery. Because of paper's low cost, that could help lower the price of batteries used in electric vehicles, wind farms, and other renewable sources.

M3 p.s. The idea of using paper to make a lightweight, flexible battery isn't new. Researchers led by Robert Linhardt, a chemist at Rensselaer Polytechnic Institute in Troy, New York, first explored the concept 2 years ago. They cast a thin film of cellulose--the same starting material used to make paper--and laid it over conductive carbon nanotubes. The hope was that the cellulose would serve as a sturdy structural material to hold the other components for making a battery, and it did.***M3 lim.past*** But the two layers remained independent and could split apart if flexed.

Yi Cui, a materials scientist at Stanford University in Palo Alto, California, had also been exploring using plastics and other types of thin layers as the structural supports for batteries and supercapacitors (which store energy as static charge, unlike batteries that undergo chemical reactions). But the plastic layers also didn't connect well with the conductive nanotubes placed on top. Conventional copy paper has a highly porous structure. So Cui and his colleagues wondered if that could serve as a good support for their nanotubes.

M6 The researchers created an "ink" of carbon nanotubes suspended in water and an organic surfactant. They then heated the paper in an oven to drive off the water. The nanotubes bonded tightly to the paper fibers, creating a highly conductive sheet of paper that functions even when rolled up. The team then used these conductive sheets as components in both lithium-ion batteries and supercapacitors.

M4 The paper batteries can store up to 7.5 Watt-hours per kilogram (Wh/kg), the team reported online this week in the *Proceedings of the National Academy of Sciences*. That's not quite up to the level of lead acid batteries, which store roughly 30 Wh/kg. But because the cost of nanotubes is coming down, and because paper is cheap and durable, it could open the door to cheaper batteries for large-scale energy storage.

M7C "It's quite innovative and an important contribution," says Linhardt. The fact that the nanotubes and paper fibers hold tight is critical, he adds, because it now enables engineers to make batteries in almost any shape. ***M8*** Paper's strength could also help battery makers reduce the thickness of the electrodes they use to make batteries, which in many cases are made thick to provide structural support for the batteries. And that reduced amount of electrode material could further reduce the battery's cost.

Surprise! Your Skin Can Hear
Wednesday, November 25, 2009
By Jeanna Bryner
ADVERTISEMENT
M2 We not only hear with our ears, but also through our skin, according to a new study.
M5 The finding, based on experiments in which participants listened to certain syllables while puffs of air hit their skin, suggests our brains take in and integrate information from various senses to build a picture of our surroundings.
M4 Along with other recent work, the research flips the traditional view of how we perceive the world on its head.
M7D "[That's] very different from the more traditional ideas, based on the fact that we have eyes so we think of ourselves as seeing visible information, and we have ears so we think of ourselves as hearing auditory information. That's a little bit misleading," study researcher Bryan Gick of the University of British Columbia, Vancouver, told LiveScience.
"A more likely explanation is that we have brains that perceive rather than we have eyes that see and ears that hear."
M7C With such abilities, Gick views humans as "whole-body perceiving machines."
M4 The research, funded by the Natural Sciences and Engineering Council of Canada and the National Institutes of Health, is detailed in the Nov. 26 issue of the journal Nature.

How We Perceive

M3 p.s. Gick's work builds on past studies showing, for instance, that we can see sound and hear light, even if we don't consciously realize it. Other studies show if you observe another person's lips moving and think that other is speaking, your brain's auditory regions would light up, Gick said.
Scientists had explained such sensing prowess as the result of experience, as we see and hear people speaking all the time and so it'd be only natural to learn how to integrate what we see with what we hear.
The alternative would be an innate ability. And so Gick and his colleague Donald Derrick, also of the University of British Columbia, studied two senses that aren't generally paired — auditory and tactile — to figure out the root of perception.

How Skin Hears

M6 The team focused on aspirated sounds, such as "pa" and "ta" that involve an inaudible burst of air when spoken, as well as unaspirated sounds, such as "ba" and "da."
Blind-folded participants listened to recordings of a male voice saying each of the four syllables and had to press a button to indicate which sound they heard (pa, ta, ba or da). Participants were divided into three groups of 22, with one group hearing the syllables while a puff of air was blown onto their hand, the other had air blown onto the neck, and the control group heard the sounds with no air.
M7 D About 10 percent of the time when air was puffed onto the skin, participants mistakenly perceived the unaspirated syllables as being their aspirated equivalents. So when the guy said "ba," such participants would indicate they heard "pa." The control group didn't show such mistaken perceptions.
A follow-up experiment in which participants got a tap on the skin rather than a puff of air showed no such mix-up between aspirated and unaspirated sounds.
M8 Next, Gick is working with scientists from the University of California, San Francisco, to figure out how the brain allows such multi-sense integration.

number 19

Newborn cells clear space in brain's memory-maker
Neurogenesis helps break old circuits in the hippocampus
By Tina Hesman Saey
December 5th, 2009; Vol.176 #12 (p. 10)

M1 Old memories may get the boot from new brain cells.
M2 A new rodent study shows that newborn neurons destabilize established connections among existing brain cells in the hippocampus, a part of the brain involved in learning and memory. ***M4*** Clearing old memories from the hippocampus makes way for new learning, researchers from Japan suggest in the Nov. 13 *Cell*.

M5 Other researchers had proposed the idea that neurogenesis, the birth of new neurons, could disrupt existing memories, but the *Cell* paper is the first to show evidence supporting the idea, says Paul Frankland, a neuroscientist at the Hospital for Sick Children in Toronto.

M3 l.c. Scientists have known that memories first form in the hippocampus and are later transferred to long-term storage in other parts of the brain. For some amount of time the memory resides both in the hippocampus and elsewhere in the brain. ***M3 lim. ongo*** What's not been known is how, after a few months or years, the memory is gradually cleared from the hippocampus.

Researchers have also debated the role of neurogenesis in learning and memory. ***M3 l.c.*** The hippocampus is one of only two places in the adult brain where scientists know that new neurons form. ***M3 p.s.*** On the basis of previous studies, many researchers think new neurons stabilize memory circuits or are somehow otherwise necessary to form new memories.

M7C The new study suggests the opposite: Newborn neurons weaken or disrupt connections that encode old memories in the hippocampus.

M6 Kaoru Inokuchi, a neuroscientist at the University of Toyama in Japan, and his colleagues used radiation and some genetic tricks to block neurogenesis in rats and mice that had been trained to fear getting a mild electric shock when placed in a particular cage. Control animals, with normal neurogenesis, eventually were able to bypass their hippocampi and retrieve the fear memory directly from long-term storage. ***M7C*** But animals in which neurogenesis had been blocked still depended on the hippocampus to recall the fear memory, the researchers found.
Running on an exercise wheel, which boosts neurogenesis, also sped the rate at which old memories were cleared from the hippocampus.

M7D But that doesn't mean new neurons aren't necessary to teach old brains new tricks, says Inokuchi.

"Our findings do not necessarily deny the important role of neurogenesis in memory acquisition," Inokuchi says. "Hippocampal neurogenesis could have both of these roles, in erasing old memories and acquiring new memories."
M8 Essentially, the new neurons may aid formation of new memories by keeping the hippocampus from filling up with old ones.

Frankland adds, "This is about as novel as it gets in the field of neurogenesis and memory. It pretty much represents an entirely new framework that other researchers will chip away at for years to come."

Science NOW UP TO THE MINUTE NEWS FROM SCIENCE

Scottish as a Second Language

by Helen Fields on November 11, 2009 12:00 AM

Say what? Watching *Trainspotting* with English subtitles helps train your ear to pick up Scottish accents. Credit: Photos12/Alamy

M1 It's a common problem for people learning a foreign language. You've mastered one dialect--say, the Norwegian spoken in Oslo or the Spanish spoken in Mexico--and then you go to Trondheim or Madrid and think, "What in the heck are these people speaking?" ***M2*** A new study offers a tip for learning to recognize unfamiliar dialects: Watch a foreign film with foreign subtitles.

M3 p.s. Humans constantly need to work out unfamiliar sounds. We talk to new people, hear new accents, and listen to familiar people with stuffy noses. Previous experiments have found that we use what we already know about a language to decode new things we hear. For example, if someone hears a strange consonant that's somewhere between an "s" and an "f" in the word "horf," they hear "horse." In "girass," people usually hear "giraffe." Which of these words they've heard then dictates whether they'll hear the sound in "nife" as "nice" or "knife."

M4 Psychologist Holger Mitterer of the Max Planck Institute for Psycholinguistics in Nijmegen, the Netherlands, wanted to see whether this "lexically guided learning" would work in real-life situations in which the listener has to understand an accent. ***M6*** Mitterer, who is German, chose to design the study around movies partly because of his own experience as an English learner. ***M3 l.c***."When I first got to the Netherlands, a couple of exchange students went to see Trainspotting"--a Scottish film about heroin addicts--"and all the others had trouble following the movie," says Mitterer. But he understood enough Dutch to get a little help from the Dutch subtitles. "By the end of the movie, I was quite comfortable in following Ewan McGregor," the star of the film.

M6 For the study, Dutch students who were fluent in English watched either a 25-minute episode of the Australian sitcom *Kath & Kim*, whose characters speak in broad accents from the Melbourne suburbs, or a version of *Trainspotting*, which was edited down to the same length by taking out the offensive parts. "I felt a bit like a film editor from the '50s," says Mitterer. "Two people are getting in the cab, they start kissing, then I cut and it's breakfast." Some students saw video with English subtitles and some with Dutch subtitles. Then the students heard sound clips of words--some they'd heard already and some new words spoken by the same characters.

M5 As the researchers report today in *PLoS ONE*, English and Dutch subtitles helped the students understand words that they'd already heard, but only English subtitles helped them understand new words in the same accent. "Let's take Australian English," says Mitterer. 'Straight away' is something like 'strite awye.' If you get that, you'll get 'kiveman,' which is supposed to mean 'caveman.' " But only if you saw the words "straight away" in English on the screen; the Dutch translation doesn't help.

M7D This makes sense, says linguist Ann Bradlow of Northwestern University in Evanston, Illinois. "When you read the Dutch words, you're bringing to the front of your mind the [Dutch] sound, even though you're not hearing the sounds, and that interferes with your ability to access the sound of English words." She recommends that the millions of non-native speakers of English in the United States put the results into action by turning on the closed-captioning for the hearing impaired on their televisions.

M8 The rest of us need a lobbying campaign to get distributors to include foreign-language subtitles on the DVDs of foreign movies, says psycholinguist Cathi Best of the University of Western Sydney in Australia. "I like the study; it's clever," she says. "It's a good foot in the door to how second-language speakers can become more flexible in the way that they recognize words."

Study finds who is afraid of the bogeyman

Friday, 13 November 2009 Nicky Phillips ABC

M1 The children felt that dads aren't scared of such creatures because they were 'brave'

M2 A new study suggests the way children cope with imaginary monsters differs with age and gender.

The research, published in today's edition of *Child Development*, also offers parents some strategies on how to help their children cope with real and imagined fears.

M6 Psychologist and study author Dr Liat Sayfan of the University of California, Davis says to understand the coping strategies of children, she and colleagues asked 48 children, aged between four and seven, to listen to a series of short stories.

Each story featured a child who came in contact with a real scary creature, such as a bear, or an imaginary creature like a witch, which children could perceive as frightening, says Sayfan.

Sayfan says she chose to make the characters in the stories experience the fear, rather than scaring the children themselves.

M5 "I didn't think parents would want me to scare their children."

She says when the children listened to stories that included real scary creatures, they suggested that the character avoid the creature.

But she says there were some differences in the coping mechanisms between the sexes.

"I found boys often suggested attacking or killing [the creature], where as girls would suggest running away and finding their parents."

Imaginary creatures

M7C Sayfan says, when the stories dealt with imaginary creatures there wasn't a difference in the suggestions between the sexes, but between the ages of the children.

M7D Preschool children wanted to turn the situation into a positive one, "they'd say things like 'let's imagine the witch is really nice'," she says.

Four year olds understand what's real and not real, but when it comes to coping with their fears sayfan says it's very difficult for them to use this knowledge to feel better.

On the other hand, six and seven year olds were able to cope by reminding themselves that the creature wasn't real, she says.

M7D "Seven year olds use this knowledge of what's real and what's not to feel better."

Sayfan says when young children say they're scared of a monster after a bad dream, parents don't need to convince their child that the creature doesn't exist.

"These [children are] really absorbed in their imagination and it's really hard for them to let this go and think about reality."

She says a better strategy is to keep their imagination going "by saying this monster is really nice," and then explain in the morning that monsters aren't real.

Adult fears

M6 As part of the study, Sayfan also asked the children to predict if other people, such as adults, would experience the same fears children have of real and imaginary creatures.

M5 She says the children felt that dads wouldn't be scared of such creatures because they were "brave".

They believed mothers might be a little scarred, says Sayfan, but not to the extent children would be.

"[Children] know really well that it's their own fear and that adults know better and aren't afraid of those sort of things."

M6 Sayfan says the idea for her study came from watching her own child's fears.

"I watched how he tried to cope with his fear and my curiosity got going about what works and what doesn't."

M8 Sayfan plans to conduct further studies in the area and assess whether children actually use the strategies they suggest as coping mechanisms.

number 22

20 November 2009

Popular cigarette brands loaded with bacteria

by Kate Melville

M2 Cigarettes are "widely contaminated" with bacteria known to be harmful to humans, claims a new study in *Environmental Health Perspectives*. ***M5*** And, according to the researchers, some of the organisms identified are resilient enough to survive the burning process.

M4 The study, conducted by a University of Maryland (UM) environmental health researcher and microbial ecologists at the Ecole Centrale de Lyon in France, is the first to show that cigarettes themselves could be the source of exposure to a wide array of potentially pathogenic microbes among smokers and other people exposed to secondhand smoke.

M7 C"We were quite surprised to identify such a wide variety of human bacterial pathogens in these products," says UM's Amy R. Sapkota, the lead researcher on the study. "The commercially-available cigarettes that we tested were chock full of bacteria, as we had hypothesized, but we didn't think we'd find so many that are infectious in humans."

M8 But can the cigarette-borne bacteria survive the burning process and go on to colonize smokers' respiratory systems? According to Sapkota, existing research suggests that some hardy bacteria can be transmitted this way, which would account for the fact that the respiratory tracts of smokers are characterized by higher levels of bacterial pathogens.

M8 "[The bacteria could] contribute to both infectious and chronic illnesses in both smokers and individuals who are exposed to environmental tobacco smoke," Sapkota warns. "So, it's critical that we learn more about the bacterial content of cigarettes, which are used by more than a billion people worldwide."

M3 p.s. Previous studies have taken small samples of cigarette tobacco and placed them in cultures to see whether bacteria would grow. But Sapkota's team took a more holistic approach using DNA microarray analysis to estimate the so-called bacterial metagenome, the totality of bacterial genetic material present in the tested cigarettes.

M7D Key findings from the analysis:

- Commercially available cigarettes show a broad array of bacterial diversity, ranging from soil microorganisms to potential human pathogens.
- Hundreds of bacterial species were present in each cigarette, and additional testing is likely to increase that number significantly.
- Bacteria identified included:
    - *Acinetobacter*
      (associated with lung and blood infections)
    - *Bacillus*
      (some varieties associated with food borne illnesses and anthrax)
    - *Burkholderia*
      (some forms responsible for respiratory infections)
    - *Clostridium*
      (associated with foodborne illnesses and lung infections)
    - *Klebsiella*
      (associated with a variety of lung, blood and other infections)
    - *Pseudomonas aeruginosa*
      (an organism that causes 10 percent of all hospital-acquired infections in the United States)
- ***M8*** No significant variability in bacterial diversity was observed across the four different cigarette brands examined: Camel; Kool Filter Kings; Lucky Strike Original Red; and Marlboro Red.

"Now that we've shown that a pack of cigarettes is loaded with bacteria, we will conduct follow-up research to determine the possible roles of these organisms in tobacco-related diseases," Sapkota said in conclusion.

number 23

ScienceDaily
Your source for the latest research news

Early Relationships Influence Teen Pain and Depression

M4 ScienceDaily (Nov. 25, 2009) — Angst could be more than a rite of passage for insecure teenagers, according to a study published in the *Journal of Pain*. ***M2*** Researchers from the Université de Montréal, Sainte-Justine University Hospital Center and McGill University have discovered that insecure adolescents experience more intense pain in the form of frequent headaches, abdominal pain and joint pain. These teens are also more likely to be depressed than peers with secure attachments.

M4 Dr. Isabelle Tremblay, a researcher at the Université de Montréal and its affiliated Sainte-Justine University Hospital Center, and Dr. Michael Sullivan, a psychology professor at McGill University, launched this study to build on previous findings that childhood experiences play a major role in the relationships people develop in later life. Simply put: insecure infants grow up to be insecure adolescents, and later, insecure adults.

M3 lim.past "Although previous studies in adults found that an individual's security level was influenced by painful experiences, it was not clear why relationship security should be related to pain," says Dr. Tremblay. ***M5*** "We found that adolescents with insecure relationships tend to be more 'alarmist' about their pain symptoms; they have a tendency to amplify the degree of threat or severity of their pain. This amplification leads to more intense pain and more severe depressive symptoms."

M6 Some 382 students, from Grades 8 through 12, were recruited for the study from a francophone high school in Montreal, Canada. Participants were asked to fill questionnaires on the frequency and intensity of their emotional and physical pain.

M7C"It is possible that individuals who have insecure relationships may perceive the world as more threatening or more stressful and that manifests in physical symptoms," says Dr. Sullivan. "Alternately, it is possible that individuals who feel insecure might 'express' more intense distress as a means of eliciting support from others in their social environment."

M7D Interpersonal factors must be considered when managing adolescent experiences of pain and depression, according to the researchers. "Adolescents have different health and mental health needs than adults. Although interpersonal factors have not been considered integral component of the treatment of pain and depression in adults, these factors might need to be considered in the treatment of adolescents," stresses Dr. Sullivan.

ScienceDaily
Your source for the latest research news

Parent Training Key to Improved Treatment of Behavior Problems in Children With Autism

M2 ScienceDaily (Nov. 26, 2009) — The serious behavior problems that can occur in children with autism and related conditions can be reduced with a treatment plan that includes medication combined with a structured training program for parents, according to Yale University researchers and their colleagues.

M4 Published in the December 2009 issue of the *Journal of the American Academy of Child and Adolescent Psychiatry*, the study was conducted by the National Institute of Mental Health (NIMH) Research Units on Pediatric Psychopharmacology (RUPP) Autism Network. The 24-week, three-site trial was conducted at Yale, Ohio State University and Indiana University. Lawrence Scahill, professor at Yale School of Nursing and the Yale Child Study Center, is principal investigator at the Yale site.

M3 lim. past Results from a 2002 RUPP report showed that the antipsychotic medication risperidone (Risperdal) reduced such behavioral problems as tantrums, aggression and self-injury in children with autism. However, most children's symptoms returned when the medication was discontinued after six months of effective treatment. Also, risperidone is associated with adverse effects such as weight gain, which can lead to obesity and related health problems.

M6 In this new study, the RUPP group tested the benefits of medication alone compared to medication plus a parent training program that actively involves parents in managing their children's severely disruptive and noncompliant behaviors. In a series of 14 sessions over six months, parents were taught to reduce their children's challenging behavior and to enhance daily living skills.

The study included 124 children ages 4 to 13 with pervasive developmental disorders (PDD) such as autism, Asperger's or related disorders accompanied by tantrums, aggression and self-injury. The children were randomly given a combination of risperidone and parent training, or risperidone only.

M5 Although both groups improved over the six-month trial, the group receiving combination therapy showed greater reduction in disruptive behavior, tantrums and aggression compared to the group receiving medication only. The combination therapy group also ended the trial taking an average dose of 1.98 milligrams (mg) per day of risperidone, compared to 2.26 mg per day in the medication-only group -- a 14 percent lower dose. However, children in both groups gained weight, indicating "a need to learn more about the metabolic consequences of medications like risperidone," noted Scahill.

M7C "The results show that the parent training intervention can be delivered in a reliable manner and results were the same across all sites," said Scahill. "This is important because it shows that the intervention is exportable -- and ready for dissemination."

M8 The RUPP group is expecting to launch a multi-site parent training study in preschool-age children with pervasive developmental disorders. "We hope to show that these behavioral problems can be reduced in children without medication -- if intervention starts early," Scahill said. "Future studies may also look for ways in which the parent training program can be used in schools and community clinics."

number 25

New Cause for Alzheimer's Disease?

M2 ScienceDaily (Nov. 27, 2009) — Dr. Carme Espinet and colleagues at the University of Lleida, Lleida, Spain have discovered that a precursor to nerve growth factor (pro-NGF) may play a pathogenic role in Alzheimer's disease. ***M4*** They present these findings in the December 2009 issue of *The American Journal of Pathology*.

M3 l.c. Alzheimer's disease is a degenerative, terminal form of dementia that affects over 35 million people world-wide. ***M5*** Oxidative stress, which occurs in the early stages of Alzheimer's disease, may modify molecules, resulting in loss or alteration of their function.

M7C A precursor to nerve growth factor (pro-NGF) is expressed at high levels in Alzheimer's disease-affected individuals, and accumulation of pro-NGF may lead to neural cell death. Kichev et al showed that pro-NGF is modified in an Alzheimer's disease stage-dependent manner by oxidative stress and that modified pro-NGF blocked processing to mature NGF and led to neuronal cell death. ***M7D*** Furthermore, injection of modified pro-NGF or pro-NGF derived from human Alzheimer's disease patients into mice resulted in cognitive and learning impairment, suggesting that modified pro-NGF may provide a novel pathogenic pathway for Alzheimer's disease.

Dr. Espinet's group suggests "that intra-cerebroventricular administration of AGE/ALEs modified pro-NGF to mice impairs learning tasks, thus reinforcing the idea that pro-NGF could have a relevant role in the ethiopathogenesis of the disease."

Examining Mathematical Abilities in Children With Fetal Alcohol Spectrum Disorder

M1 ScienceDaily (Nov. 20, 2009) — Children with fetal alcohol spectrum disorder (FASD) have a number of cognitive deficits, but mathematical ability seems particularly damaged. Little is known about the brain structures related to mathematical deficits in children with FASD. ***M2*** A new study that used diffusion tensor imaging (DTI) to investigate the relationship between mathematical skills and brain white matter structure in children with FASD supports the importance of the left parietal area for mathematical tasks.

M4 Results will be published in the February 2010 issue of *Alcoholism: Clinical & Experimental Research*.

M3 l.c. "Children with FASD have learning difficulties with reading, memory, executive functioning, attention, and mathematics," said Christian Beaulieu, associate professor in the department of biomedical engineering at the University of Alberta and senior author for the study.

M5 "Specific deficits in mathematics exist even when their global deficits are taken into account," added Claire D. Coles, professor of psychiatry and behavioral sciences at the Emory University School of Medicine. "Children with FASD are similar in their presentation to children with nonverbal learning disabilities, which are sometimes associated with visual/spatial deficits and math deficits; one of the factors thought to produce these effects is deficits in white matter integrity."

M3 p.s."From studies of brain function, we know that the parietal brain regions are involved in mathematics and number tasks," said Catherine Lebel, a Ph.D. student in biomedical engineering who is also corresponding author for the study.***M6*** "We knew that mathematics was a key deficit in FASD and decided to examine which brain structures were related to these mathematical deficits."

The researchers used DTI to scan 21 children (12 boys, 9 girls), five to 13 years of age, who had been diagnosed with FASD in an earlier study; they also used a cognitive assessment to establish the children's mathematical abilities.

M7D "We found that four different brain areas show correlations between structure and mathematical ability in children with FASD," said Lebel. "Two of these regions in the left parietal area are very similar to previous findings in healthy children and in a rare genetic disorder, suggesting that these regions are key areas for math across diverse populations. The two other regions -- the cerebellum and the brainstem -- might be unique to children with FASD in terms of math-structure relationships."

M3 l.c. "The parietal lobes are what is referred to as the 'association' cortex because it is clear that it is in these areas that a great deal of the higher level 'thinking' occurs, in which different aspects of sensory processing -- such as visual and auditory information -- as well as cognitive activities are 'associated,'" said Coles. "Math processing relies on a number of skills, visual/spatial skills, executive functioning (which rely on the frontal lobes), and probably the corpus callosum which allows integration of information in the two hemispheres. ***M7C*** Previous research has also shown that 'math' processing is associated with certain parts of the parietal lobes. However, different areas seem to be related to different processes, like addition and subtraction, and more difficult kinds of math involve more areas, which are interrelated in 'networks.'

"Our findings demonstrate a link between brain structure and cognition that provides insight into how the FASD brain works," said Lebel, "and also help understand mathematical processing in a larger population because of the similarities to previous studies. ***M8*** Ultimately, a better understanding of the underlying cause of the various cognitive deficits in FASD may lead to better treatment and improved quality of life

New Tool for Helping Pediatric Heart Surgery

ScienceDaily (Nov. 27, 2009) — ***M2*** A team of researchers at the University of California, San Diego and Stanford University has developed a way to simulate blood flow on the computer to optimize surgical designs. ***M5*** It is the basis of a new tool that may help surgeons plan for a life-saving operation called the "Fontan" surgery, which is performed on babies born with severe congenital heart defects.

M4 The researchers will present their work next week at the 62nd Annual Meeting of the American Physical Society's (APS) Division of Fluid Dynamics will take place from November 22-24 at the Minneapolis Convention Center.

M3 l.c. Babies who get this surgery have a developmental disease where one of the chambers -- or ventricles -- of the heart fails to grow properly. This leaves their hearts unable to properly circulate blood through their lungs and starves their bodies of oxygen. The lack of oxygen turns their skin blue, a condition sometimes referred to as "blue baby syndrome" for that reason.

M7D The Fontan surgery is one of three surgeries performed immediately after birth to replumb the circulation of children born missing their left ventricles. The operation essentially connects the veins that would normally bring blood into the right side of the heart with the pulmonary arteries. The aim is to redirect the blood flow so that it becomes properly oxygenated, allowing the patient to survive with only one functional pumping chamber. Before the advent of this type of surgery in the early 1970's, these sorts of heart conditions were uniformly fatal.

M3 lim. ongo There are still risks, including exercise intolerance, blood clot formation, and eventual heart failure requiring transplantation. ***M6*** Doctors mitigate this risk by carefully planning the surgery, starting with images of a baby's heart and then sketching out their plans. UCSD's Alison Marsden has been working with surgeons at Rady Children's Hospital and Stanford University to develop a new computational tool to assist in this process. ***M7C*** In addition, Dr. Marsden and cardiologist Jeff Feinstein have developed a new Y-graft design for the Fontan surgery that is expected to be put into clinical use within a few months.

M8 "Our ultimate goal is to optimize surgeries that are tailored for individual patients so that we don't have to rely on a "one-size fits all" solution," says Marsden.

M6 The tool first uses imaging data to construct a model of an individual baby's heart and then allows doctors to input their surgical designs. The computer can then systematically explore different potential designs using powerful optimization algorithms, similar to those used in the aerospace industry for aircraft design. It then applies fluid dynamics to simulate the blood flow after reconstruction. ***M7C*** This way, says Marsden, surgeons can test their plans and evaluate blood flow patterns before operating.

The New York Times

November 24, 2009
Observatory
By Happy Accident, Chemists Produce a New Blue
By KENNETH CHANG

M1 Blue is sometimes not an easy color to make.

M3 l.c. Blue pigments of the past have often been expensive (ultramarine blue was made from the gemstone lapis lazuli, ground up), poisonous (cobalt blue is a possible carcinogen and Prussian blue, another well-known pigment, can leach cyanide) or apt to fade (many of the organic ones fall apart when exposed to acid or heat).

M2 So it was a pleasant surprise to chemists at Oregon State University when they created a new, durable and brilliantly blue pigment by accident.

M6 The researchers were trying to make compounds with novel electronic properties, mixing manganese oxide, which is black, with other chemicals and heating them to high temperatures.

M5 Then Mas Subramanian, a professor of material sciences, noticed that one of the samples that a graduate student had just taken out of the furnace was blue.

“I was shocked, actually,” Dr. Subramanian said.

M6 In the intense heat, almost 2,000 degrees Fahrenheit, the ingredients formed a crystal structure in which the manganese ions absorbed red and green wavelengths of light and reflected only blue.

When cooled, the manganese-containing oxide remained in this alternate structure. The other ingredients — white yttrium oxide and pale yellow indium oxide — are also required to stabilize the blue crystal. When one was left out, no blue color appeared.

M7 The pigments have proven safe and durable, Dr. Subramanian said, although not cheap because of the cost of the indium. ***M8*** The researchers are trying to replace the indium oxide with cheaper oxides like aluminum oxide, which possesses similar properties.

M4 The findings appear in the Journal of the American Chemical Society.

number 29

Chocolate Reduces Stress, Study Finds
By Clara Moskowitz, LiveScience Staff Writer
posted: 11 November 2009 02:13 pm ET

M2 Go ahead, grab a chocolate bar. New evidence is in that eating dark chocolate every day can reduce stress.

M5 The study, announced today, found that people who rated themselves highly stressed to begin with had lower levels of stress hormones after eating chocolate every day for two weeks. ***M6*** The study's subjects ate 1.4 ounces (40 g) of dark chocolate daily, or a little less than a regular-sized Hershey's bar, which contains 1.55 ounces (44 g).

The doctors took urine and blood plasma samples from the participants at the beginning, halfway through, and at the end of the two week study,***M7D*** and found lower levels of the stress hormones cortisol and catecholamines in the samples at the end.
M6 The study was small, however — just 30 people — ***M8*** so further research is needed to verify the results.

M4 The scientists, led by Sunil Kochhar of the Nestle Research Center in Switzerland, detailed their findings in the Oct. 7 issue of the Journal of Proteome Research.

M7C "The daily consumption of dark chocolate resulted in a significant modification of the metabolism of healthy and free living human volunteers with potential long-term consequences on human health within only 2 weeks treatment," the researchers wrote in the paper. "This was observable through the reduction of levels of stress-associated hormones and normalization of the systemic stress metabolic signatures."

M7D The study adds to a growing body of research showing that certain elements in chocolate — such as antioxidants called polyphenols — can have helpful health benefits. Previous studies found chocolate can help fight heart disease and reduce the chances of developing cancer.
Of course, moderation is key. Since most chocolate products contain fat and sugar, it's possible to have too much of a good thing.

News in Science

Lithium provides clue to planet presence

Friday, 13 November 2009 Stuart Gary

ABC

M5 The presence of a proto-planetary disc might slow down the star's rotation resulting in a drop in its lithium content *(Source: ESO/L Calcada)*

M2 Scientists in Spain believe they've found a link between the amount of lithium in Sun-like stars, and whether they have planets orbiting them.

M4 Reporting in the science journal *Nature*, the team led by Dr Garik Israelian of the Instituto de Astrofisica in the Canary Islands have concluded that Sun-like stars with planets have significantly less lithium in their spectra than similar stars without planets.

M5 The researchers believe it may also help solve a longstanding puzzle about the Sun's lithium levels, which has 140 times less lithium than the primordial value - the amount produced in the big bang.

M3 lim. ongo Why the Sun has so little lithium is a question astronomers have been unable to answer.

The Sun's surface isn't hot enough to burn lithium. And its convective zone does not extend deep enough into the interior to reach the sort of temperatures and pressures needed for lithium to fuse.

Planetary link

M6 Israelian and colleagues looked at a sample of stars similar in age, mass and chemical make up to the Sun.

M7 D They found those with planets, all have less than 1% of the primordial lithium abundance.

Those without detected planets range more widely, with half having about 10% of the primordial lithium abundance.

M7C Israelian and colleagues believe the key to the difference could be the interaction between the star and its orbiting planets early in the system's evolution.

M7D They propose that early in a star's life, the presence of planets or at least a proto-planetary disc, might slow down the star's rotation.

A slower rotational speed increases the depth of the star's convective layer, thus changing the amount of surface material mixing down into the interior.

This would result in more lithium being transported deep into the stars where it could be fused, increasing lithium depletion in its early stages.

Concerns

M3 lim. ongo But Dr Charles Lineweaver of the Australian National University's Mt Stromlo Observatory remains sceptical.

Lineweaver says the researchers only looked at a narrow band of stellar surface temperatures. He also believes that astronomers don't fully understand enough about how a star's convective layer thickness is influenced by the star's age or its rotational speed.

Lineweaver is also concerned that many of the stars listed in the study as having no detected planets, could actually have planets that simply haven't been detected yet.

M8 Still, if the work of Israelian and colleagues is correct, it may provide an additional method of searching for extra-solar planets and possibly extraterrestrial life

number 31

Quit Smoking, Get Diabetes?
By *News Account*
Created *Jan 4 2010 - 2:00am*
M4 Although smoking is a well-known risk factor for type 2 diabetes, new research published in the January 5 issue of *Annals of Internal Medicine* suggests that quitting the habit may actually raise diabetes risk in the short term.***M2*** Researchers found that people who quit smoking have a 70 percent increased risk of developing type 2 diabetes in the first six years without cigarettes as compared to people who never smoked.

M5 The risks were highest in the first three years after quitting and returned to normal after 10 years. Among those who continued smoking over that period, the risk was lower, but the chance of developing diabetes was still 30 percent higher compared with those who never smoked.

M6 The study enrolled 10,892 middle-aged adults who did not yet have diabetes from 1987 to 1989. The patients were followed for up to 17 years and data about diabetes status, glucose levels, weight and more were collected at regular intervals.

M3 l.c.Type 2 diabetes is a common disease that interferes with the body's ability to properly use sugar, and to regulate and properly use insulin, a substance produced by the pancreas which normally lowers blood sugar during and after eating.

In type 2 diabetes, also known as adult-onset diabetes, the pancreas makes plenty of insulin to help the body when food is eaten, but the body cannot use it normally. The result is excess levels of blood sugar, which over time, can lead to blindness, kidney failure, nerve damage and heart disease. Overweight people and those with a family history of the disease have an increased risk for developing it, as do smokers, though the causal relationship is unclear.

M7D According to the study, those who smoked the most and those who gained the most weight had the highest likelihood for developing diabetes after they quit. On average, over the first three years of the study, quitters gained about 8.4 pounds and saw their waist circumferences grow by approximately 1.25 inches.

M7D Researchers suspect the elevated diabetes risk is related to the extra pounds people typically put on after renouncing cigarettes and caution that no one should use the study's results as an excuse to keep smoking, which is also a risk factor for lung disease, heart disease, strokes and many types of cancer.
M8 Yeh and her colleagues want physicians to keep these findings in mind when they are consulting with patients who are giving up cigarettes, especially the heaviest smokers. They recommend considering countermeasures such as lifestyle counseling, aggressive weight management and the use of nicotine-replacement therapy, which seems to blunt the weight gain related to quitting. Another key step is more frequent blood glucose screening to assure the earliest detection of diabetes

Running shoes may cause damage to knees, hips and ankles

M1 New York, NY, January 4, 2010 – Knee osteoarthritis (OA) accounts for more disability in the elderly than any other disease. ***M2*** Running, although it has proven cardiovascular and other health benefits, can increase stresses on the joints of the leg. ***M4*** In a study published in the December 2009 issue of *PM&R: The journal of injury, function and rehabilitation*, researchers compared the effects on knee, hip and ankle joint motions of running barefoot versus running in modern running shoes. They concluded that running shoes exerted more stress on these joints compared to running barefoot or walking in high-heeled shoes.

M6 Sixty-eight healthy young adult runners (37 women), who run in typical, currently available running shoes, were selected from the general population. None had any history of musculoskeletal injury and each ran at least 15 miles per week. A running shoe, selected for its neutral classification and design characteristics typical of most running footwear, was provided to all runners. Using a treadmill and a motion analysis system, each subject was observed running barefoot and with shoes. Data were collected at each runner's comfortable running pace after a warm-up period.

M5 The researchers observed increased joint torques at the hip, knee and ankle with running shoes compared with running barefoot. Disproportionately large increases were observed in the hip internal rotation torque and in the knee flexion and knee varus torques. An average 54% increase in the hip internal rotation torque, a 36% increase in knee flexion torque, and a 38% increase in knee varus torque were measured when running in running shoes compared with barefoot.

M7D These findings confirm that while the typical construction of modern-day running shoes provides good support and protection of the foot itself, one negative effect is the increased stress on each of the 3 lower extremity joints. These increases are likely caused in large part by an elevated heel and increased material under the medial arch, both characteristic of today's running shoes.

M7C Writing in the article, lead author D. Casey Kerrigan, MD, JKM Technologies LLC, Charlottesville, VA, and co-investigators state, "Remarkably, the effect of running shoes on knee joint torques during running (36%-38% increase) that the authors observed here is even greater than the effect that was reported earlier of high-heeled shoes during walking (20%-26% increase). Considering that lower extremity joint loading is of a significantly greater magnitude during running than is experienced during walking, the current findings indeed represent substantial biomechanical changes."

M8 Dr. Kerrigan concludes, "Reducing joint torques with footwear completely to that of barefoot running, while providing meaningful footwear functions, especially compliance, should be the goal of new footwear designs."

Why Fish and Red Wine Don't Mix numer 33

By Phil Berardelli 2009-10-25 16:50:51

M1 For ages, diners have been told that drinking red wine while eating seafood can produce an unpleasant fishy aftertaste. The rule of thumb has been red wine with meat, white wine with fish.***M3 lim.onqo*** But the rule is not hard and fast. Seafood can taste fine with some reds, whereas some whites can ruin the meal. ***M2*** What's the common factor?
Researchers at Mercian Corp. in Fujisawa, Japan, a division of which produces wine and spirits, decided to find out. ***M6*** They conducted an experiment with seven experienced wine tasters who were offered 38 varieties of red and 26 types of white. Over four sessions, the volunteers tasted the samples, along with pieces of scallops, the seafood most likely to produce the fishy effect. Then the researchers chemically analyzed the wines for a possible link to the aftertaste.

M4 The culprit appears to be iron, the team reports in a recent issue of the Journal of Agricultural and Food Chemistry. ***M5*** When the element's content rose above 2 milligrams per liter or so, the seafood-dining experience turned sour. ***M6*** The team double-checked their results by soaking pieces of dried scallops in samples of wine. Scallops dunked in vino with low iron content smelled normal, but pieces soaked in samples with high iron content reeked of fish.

M7D The researchers report that they haven't yet isolated the compound in the scallops that reacts with the wine, but they suspect it's an unsaturated fatty acid, which could be breaking down rapidly and releasing the decaying fish smell when exposed to iron. ***M3 l.c.*** .How much iron a wine contains depends on the amount in the soil where the grapes were grown, as well as other factors such as how the grapes are harvested and processed. Red wine tends to have a higher iron content, hence the admonition against mixing it with seafood.

M7C "We were surprised in our finding," says research chemist and lead author Takayuki Tamura, "because we thought that polyphenols or sulfur dioxide [produced] the unpleasant sensation." These components represent a larger percentage of wine content than does iron. He explains that because iron does not "induce color change, accelerated oxidation, or cloudiness," vintners tend to ignore its potential role as a meal-spoiler. But the new findings, he says, offer winemakers the opportunity to reconsider the downside of iron contamination.

M7D The paper's science is sound, says enologist Gordon Burns of ETS Laboratories in St. Helena, California. Still, he says, there are better reasons to avoid red wine with fish: Any robust red wine, regardless of iron content, would likely overwhelm the delicate, subtle flavor of many seafood dishes. Red wine, he says, often pairs better "with a big stew or a hearty chunk of meat."

VACCINE MAY HEAD OFF GENITAL CANCER IN WOMEN

Therapeutic shots can wipe out precancerous growths caused by HPV

By Nathan Seppa

Web edition : Wednesday, November 4th, 2009

M2 A series of shots can knock out genital lesions in women infected with a dangerous strain of human papillomavirus, or HPV, a new study finds. ***M5*** Although the experimental vaccine wasn't effective in everyone tested, most of the women showed benefits and many appear to have developed long-lasting immunity against this strain of HPV and the precancerous growths it can spawn.

M4 Two other vaccines, Gardasil and Cervarix, have been approved to prevent HPV infection in girls and young women who have not yet been exposed to the virus.***M5*** The new vaccine is different; it can successfully treat active HPV infection that has triggered the development of the precancerous growths, researchers report in the Nov. 5 *New England Journal of Medicine*.

M7D "This is a wonderful demonstration that these lesions can go away with vaccination," says cancer immunologist Olivera Finnof the University of Pittsburgh School of Medicine. In the best-case scenario, these shots will deliver long-lasting protection, but only large-scale testing and extended follow-up will establish that, Finn says.

M6 Researchers recruited 20 women who had such skin lesions affecting external genital tissue. The tissue abnormalities, caused by HPV-16, the most common cancer-causing strain of the virus, cause pain, itching and burning, says study coauthor Gemma Kenter, a gynecologist who worked on the study while at Leiden University in the Netherlands. ***M3 lim.ongo*** Although the lesions can be removed with laser treatment or surgery, they commonly recur, says Kenter, now at VU University Amsterdam.

M6 All the volunteers received the new vaccine in a series of three or four injections that contain synthetic versions of two HPV proteins, dubbed E6 and E7. The vaccine alerts the immune system to produce T cells — a type of white blood cell — that will target any cells making these proteins.

M7D Two years after vaccination, these vulvar intraepithelial lesions had disappeared in nine women and showed partial improvement in four others. One additional participant appeared to benefit but died of heart failure before the trial was completed.

M3 lim.past Six women failed to improve. While it remains unclear why six women derived no benefit, Kenter says, all had large lesions and most had been fighting the precancerous growths for 10 years or more.

The new vaccine mobilizes T cells, immune agents that can root out viruses that have already invaded a cell, says Finn. Viruses survive by incorporating their DNA into a cell's genetic material. The resulting genetic changes induce HPV-infected cells to produce viral proteins, which contribute to a cell's aberrant growth.

However, cells making E6 and E7 proteins get the attention of roving T cells. These immune sentinels respond by pouring out interferon-gamma, a cell-signaling molecule. It serves as a fire alarm, attracting immune troops to kill HPV-infected cells.

M3 l.c. HPV is extremely common, often infecting women without causing symptoms***. M7DThe*** new vaccine mimics the way most women clear HPV infections without ever developing lesions or cancer.

Among women who benefitted from the vaccine in the new study, the body cleared out infected cells, which Gardasil and Cervarix vaccines have not been shown to do, Kenter says. Those vaccines stimulate production of antibodies that lie in wait for newly arriving viruses — which makes them very effective in girls and young women who have never been exposed to HPV. It remains unclear how effective those vaccines will be for women in their 20s and older who may have a latent HPV infection, Kenter says.

M8 For now, the goal will be to use the new vaccine therapeutically – if it gets approval — in women with precancerous genital lesions, Kenter says. The Dutch team is already working on a larger trial

New way to 'stop' premature birth

M2 The Newcastle University team tested the drug Trichostatin A on tissue taken from 36 women undergoing a caesarean.

The researchers said the therapy worked by increasing the levels of a protein that controls muscle relaxation.

M3 l.c. One expert said with rates of premature births rising - there are 50,000 a year in the UK - a new treatment was badly needed.

" **When you consider that preterm birth rates are rising in all four countries of the UK a new more effective drug is badly needed** "
Professor Jane Norman, RCOG

Preterm labour and birth continue to be the single biggest cause of death in infants in the developed world and around 1,500 babies die in the UK every year.

M3 lim.ongo A number of drugs are used to try to stop early labour, but most have serious side effects.

M3 l.c. Trichostatin A (TSA) is known to promote the death of cancer cells.

M6 The researchers got permission to take samples of the muscles of women undergoing caesarean sections at the Royal Victoria Infirmary in Newcastle, the Cellular and Molecular Medicine journal reported.

Contractions

M6 They exposed the muscle to TSA and measured the effects on both spontaneous contractions and those induced by the labour drug, oxytocin.

M5 They found an average 46% reduction in contractions for the spontaneously contracting tissue and an average 54% reduction in the oxytocin induced contractions.

M3 p.s. It has been previously shown that a protein kinase A (PKA) is involved in controlling the relaxation of the uterus during pregnancy.

M7D The researchers showed that TSA increased the levels of a protein sub-unit of PKA.

Professor Nick Europe-Finner, who led the research, said: "We will not give this drug to a patient because it can damage as many as 10% of the genes in a cell.

"But it does show us that other more specific agents that act on the same enzymes but only one at a time are worth investigating."

New treatment

M7C Dr Yolande Harley, deputy director of research at Action Medical Research which funded the study, said: "This project has uncovered some of the molecular pathways that regulate uterine contractions and so could be linked to premature birth.

M8 "It could have a role in preventing premature birth - finding a new treatment for early labour would be a major step forward."

Professor Jane Norman, a spokeswoman for the Royal College of Obstetrics and Gynaecology (RCOG), said: "At the moment, it's not possible to treat preterm labour effectively. We only have drugs that delay it by 24 hours or so - not enough to deliver the baby safely.

M7D "One of the interesting things about this research is that they are using a new kind of drug - the drugs we are currently using have been around for a long time.

"And they are targeting pathways we have not known about before.

M8 "When you consider that preterm birth rates are rising in all four countries of the UK a new more effective drug is badly needed."