10th **IPB Erasmus Week**

Teaching Crossroads

Edited by

Elisabete Silva
Clarisse Pais
Luís S. Pais

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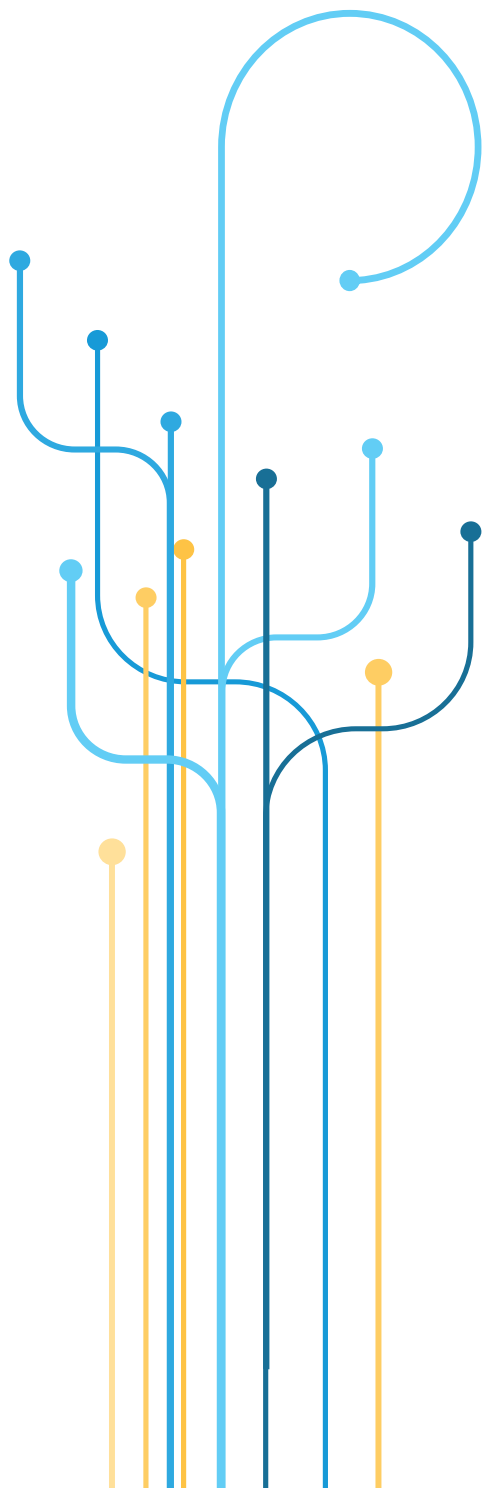
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Preface

Elisabete Silva; Clarisse Pais; Luís S. Pais

The Editors

This is the fourth number of a project which started in 2011 when the idea of publishing the lectures delivered by guest teachers in our Erasmus Week came up. This annual event is organised by the Polytechnic Institute of Bragança (IPB) and takes place normally in the beginning of May. The title was not difficult to find as the main purpose with this publication was to include every research and teaching areas fitting a multidisciplinary journal with a very specific European approach, however centred in Portugal, at the IPB. Therefore *Teaching Crossroads* was born aiming at reaching the largest number of readers within both the Portuguese and the international academic community.

In the first three years of publication, we published more than 30 articles including areas as different as business sciences and law, agricultural sciences and natural resources, chemistry, multimedia, tourism, nursing and health care, economics, education, information technology and applied sciences, but yet so far-reaching. Always intending to improve the quality and rigour of this journal, the two last numbers have already been peer-reviewed.

This is now the number regarding the 10th Erasmus Week that took place in May 2014. This year, the focus of our attention is placed on Education and Chemistry. Concerning the whole publication, we present you with a brief description of each article.

Astrid Ebenberger focuses on the Austrian Educational system, demonstrating how it has been influenced by early 20th century pedagogues, namely Ellen Key, Maria Montessori and Helen Parkhurst, whose ideas and actions became paramount in the transformation of the educational system in Austria. The author also puts forth an outline of further developments of teacher education, drawing some critical guidelines regarding the sustainability of the Austrian education system in the future.

Cláudia Martins, who lectures a seminar on the Portuguese language and culture to the guest teaching and non-teaching staff during our Erasmus Weeks, enlightens us about cognitive linguistics, particularly focusing on figurative language and tropes. Metaphors are here the crux of the matter and the author shows how they are omnipresent in languages in our daily lives. That is, one needs to understand metaphors as conceptual sources that reveal crucial for the understanding of the semantic meaning of both synchronic and diachronic cultural and social categories and concepts that define human experience and therefore language. The author focuses on the area of Portuguese food expressions serving us delightful metaphors, getting our taste buds tingling at the Portuguese language and culture.

Kamil Mielnik gives us an account of the Polish gymnasium, 3rd Cycle of Basic Education or junior high school, for pupils aged 13 to 16, with regard to the Common European Framework of Reference for Languages (CEFR), while he also describes formative assessment and its features, as well as the European Language Portfolio, explaining ultimately how the latter can strongly support self-regulated learning in Polish Gymnasium.

Katarzyna Morena deals with a very common problem as far as learning a new language is concerned, that is language anxiety. The author focuses on the speaking skill by highlighting problems and effects associated with speaking in front of the others, either in a formal or informal context. In the study the author carried out, some strategies are presented so that teachers can teach their students how to overcome anxiety problems.

Elżbieta Wojaczyńska demonstrates in her article how the area of organic chemistry can appear to be fairly pertinent in our daily lives be it, for instance, on pharmaceutical, cosmetic, or agrochemical industries. Even though we're not aware of it or never question the existence of the product compounds, this is of the utmost importance for health issues. Therefore, the author focuses on the methods of preparation of nonracemic sulfoxides and examples of their various applications in asymmetric synthesis as chiral substrates and inducers, organocatalysts or in complexes with different metals.

We would like to seize the opportunity to thank all the contributors that so far have participated in the consolidation of *Teaching Crossroads*, namely authors and reviewers. It is also worth mentioning the helpful and valuable work of Soraia Maduro, the designer of the most appealing and well-adjusted cover, and Atilano Suarez who sets the book layout in a very perfectionist way.

Being all said, we are once more proud of making interesting and relevant studies available to the academic community, not only to the IPB, but also to the rest of the European and other international universities, IPB partners in the educational promotion and cooperation. Therefore, we wish you a very enjoyable and meaningful reading.

Education

Development of the
Austrian Educational System:
From a new teaching philosophy
to a new educational system

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Abstract

Since the beginning of the new millennium a fundamental change in the Austrian school system has been going on, which is based on ideas that are not really new. At the beginning of the 20th century, Ellen Key, Maria Montessori and Helen Parkhurst set the impulse by depicting children as human beings who have to be treated individually. It took a long time until these aspects influenced the philosophy of the Austrian school system. Their impact on the primary school system is now transferred into a new model of lower secondary school. This article will provide an overview of this transformation from the first steps in the Austrian school system to the current situation at schools as well as to the impact of the aspects of progressive education on the curriculum of the New Secondary School. It will also give an outline of further developments of teacher education in Austria. The focus lies on how sustainable this system change will be, so that children and new teachers will be able to deal with living and working conditions of the future.

Keywords: *school development, progressive education, individualization, differentiation, teacher education.*

Historical Development of Education in Austria – General Overview

Until the 18th century most of the educational system was the responsibility of churches. The roots of the "Gymnasium" (schools for upper secondary education) are to be found in the schools of the monks and located next to the cathedrals. In the Age of Reason (roughly from 17th to 18th centuries), sovereigns recognized the importance of education also for rural people as a paradigm of agricultural success and common welfare. When the order of the Jesuits in Austria – which was mainly responsible for education – was expelled, the government had to come up with a way to support schools. Empress Maria Theresia (1740- 1780) called Ignaz Felbiger, an abbot and counsellor of the Empress in educational belongings, to create a new school system. With the Common School Act ("Allgemeine Schulordnung"), the first great school law was established in 1774 (6th December). It covered three different types of primary schools: best-practice schools in urban places, where teachers were also educated ("Normalschulen"), primary schools in big cities ("Hauptschulen") and primary schools in villages with churches ("Trivialschulen") (Scheipl & Seel, 1987, pp. 11-15).

After the revolution of 1848 and the important defeat at the battle of Königgrätz (1866), Emperor Franz Joseph 1st had to grant more democracy to the people. A treaty guaranteed the Hungarians independence. The constitutional monarchy was created and new laws were passed, among them the Primary School Act ("Reichsvolksschulgesetz") in 1869. Different subjects had to be taught and the curricula were now the responsibility of the Ministry of Education. Children had to attend school for eight years starting at the age of six (Scheipl & Seel, 1987, pp. 60-61).

The beginning of the 20th century – an age of pedagogical reforms and progressive education based on the ideas of Ellen Key, Maria Montessori and Helen Parkhurst – also influenced Austria. Otto Glöckel (1874-1935) can be highlighted as one of the most important Austrian reformers. This period also signified the start of the ongoing debate of different views on education between the main political parties, the social democratic and the conservative people's party. The Secondary School Act ("Hauptschulgesetz") of 1927 was created as the base for the current system (Scheipl & Seel, 1987, p. 94). Parallel to lower secondary education in Secondary Schools ("Hauptschulen") the "Gymnasium" – mostly private schools – also developed curricula for lower secondary education and offered four years of lower secondary education as a preparation for the following upper secondary education. Not everybody could afford sending the children to these private schools or had access to these schools which very often were run as boarding schools. So the existence of different school types supported the increase of social inequality. Up to now this differentiation in the educational system has been part of debates between the political parties.

After the Second World War (1939-1945), the existing laws were redesigned as school acts of 1962 and 1969 thus building the new constitutional base for the

current system. Since then, children have had to attend school for 9 years; but the parents can decide whether they send their children to school or they pay for private "home-education". Under these circumstances the pupils have to pass state exams every year.

Teacher Training Colleges ("Pädagogische Akademien") were founded and primary school teachers were educated there. In order to be qualified to teach in secondary schools, they had to attend in-service courses to specialize and qualify for different main subjects like Mathematics, German or English and "side" subjects like Biology, Geography, History, Physics, Arts, Music and Physical Education. Since 1975, the Teacher Training Colleges have been divided into three branches of teacher education: for primary school teachers (2 years and later 3 years), for special-needs teachers (3 years) and for secondary school teachers (3 years). Teaching practice completes the theoretical studies. But in 2007, the Teacher Training Colleges – as part of post-secondary non-tertiary education - were transformed into University Colleges – as part of tertiary education (Scheipl & Seel, 2004, p. 202 ff.) – and with curricula corresponding to the Bologna Process. The students now graduate as Bachelors of Education

Since the 1980s, new efforts have been made to change the old educational system, which was very teacher-centred and instructive. The emphasis on individualization and the greater focus on competences and skills (e.g. personal, social) rather than on theoretical knowledge has led to a reform of the primary school system and created different autonomous types of Lower Secondary Schools. One important difference between Lower Secondary School and "Gymnasium" was the organisational differentiation via stream within Lower Secondary Schools. It supported on the one hand the separate education of the gifted pupils apart from the weaker children, on the other hand it put a lot of pressure on parents, pupils and teachers. Children were separated into stream in Mathematics, Foreign Language Learning (mostly English) and German based on their marks in Primary School and the prediction of the teachers, whereas in the "Gymnasium" children were taught together in one class. Many people had the impression that once being settled in a stream there was – although guaranteed by law - no chance to get into a better group and it made transition into upper school education very difficult. For this reason parents found it important for their children to attend the "Gymnasium". So the choice between these two both types of lower secondary education at the age of ten was a great challenge for everybody and it still is.

There has always been a gap between rural and urban situations, between rich and poor people, between children descending from parents with higher education and parents with only secondary or only primary school education, and – as Austria has become a more and more multicultural country – between native Austrians and immigrants. In 2008, the New Secondary School was introduced and this

constituted a new effort towards one common school for children between 10 and 14, which intended to guarantee the same educational conditions for each child.

Figure 1: *Overview of the current Austrian School System (Ministry for Education and Woman, BMBF, 2014).*

But today it is obvious that it was only a shallow compromise between the political parties involved instead of a significant change. In fact, it should have been the moment for the introduction of a new philosophy of education: child-centred, supportive, with a focus on the interests, the gifts and the strengths of children, and the development of social and personal competences – all the characteristics of a sustainable education that children need in order to be prepared for the future. The United Nations Educational, Scientific and Cultural Organization (UNESCO) pointed out, in the announcement of a "Decade of Education for Sustainable Development, 2005-2014", that "Education for Sustainable Development allows every human being to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future" (UNESCO, 2014).

The New Secondary School – transferring the philosophy of "progressive education" into sustainable future-oriented education

Since the abolishment of streams (for either gifted or weaker pupils), coping with heterogeneous classes has become daily routine. Dealing with these different circumstances has become crucial for schools and educational quality. Schools have to prepare young learners for their future life and place in economy and society and to accomplish this function children must find out who they are and where their strengths and interests lie. They have to achieve competences to deal with

all the challenges in the future and thus education has to focus on what is really sustainable. One answer to all these currently raised questions seems to be found in differentiation and individualization. Although it should have always been part of didactics and methodology, it was hardly ever practiced. Therefore, the national educational policy has created a model that is based on individualization and differentiation – the New Secondary School (NMS). After only a few experimental years, it was enshrined in law in 2012 and replaced the old form of Secondary School (BMBF, 2014).

The philosophy of New Secondary School includes six main features, as represented in figure 2: diversity, competence-based learning, differentiation and individualization, new forms of assessment, "learn design backwards" and focus on learning, which shall be defined below.
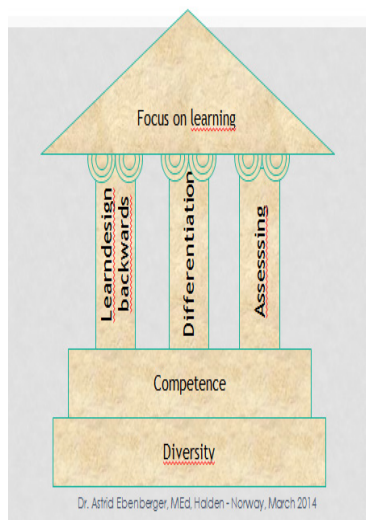
Figure 2: House of New Secondary School.

In terms of diversity, it is obvious that in each class, there are pupils with different interests, different abilities, different needs, different social and cultural backgrounds, different languages, among others. Teachers have to face this diversity and have to adapt their didactics and their methods to cater for all those different needs. It also means that education has to become inclusive and open to all pupils, whether they are impaired or not. The new teacher education follows this aspect and has integrated inclusion and integration as a main focus in the University Colleges whereas special-needs teacher education as a special type of studies is going to be abolished with the coming year 2015/16.

As far as differentiation is concerned, teachers prepare different materials according to different learning styles, multiple intelligences, interests and talents, so that pupils can choose individually from that wide range of tasks according to their interests, intelligences, learning attitudes (speed, style). Because of this, differentiation provides the highest level of individualization from the pupils´ points of view.

New forms of assessments, such as portfolios, verbal descriptions, pupil-parent-teacher-conferences, are established to reflect upon and evaluate learning processes, as well as support individual development. The majority of summative forms of assessment intend to partly replace more formative forms of assessment.

Learning should be competence-based and lead to the development of stronger social competences, more personal competences, increasing methodological competences, leading to independent and autonomous learning and combining different subjects, e.g. through project work. Learning should focus on goals and not merely on content. That means that the whole planning work and all decisions on methods should start from the final objectives as the main point of view – what is called "learning design backwards". Teaching and giving instructions has to lead to real learning in terms of transferring this into knowledge and competences, independence and self-confidence and not into rote learning for tests and marks. Learning and schools should be a natural part of life, so that learning turns into a sustainable life-long process.

This focus on the individual development is not brand-new. It first appeared at the beginning of the 20th century in the philosophy of Ellen Key with her announcement of an "Age of the Child" and led towards an important school development, which is termed progressive education through the work of people like Maria Montessori, Helen Parkhurst, Peter Petersen, Celestin Freinet, Rudolf Steiner and many more. Many of their ideas became the base of the New Secondary School philosophy and owing to this the pedagogic approach of NMS should reflect the features that all progressive education models have in common: the focus on the individual development to achieve all competences needed to live a successful life.

The following overview is given, in table 1, to introduce the most important models of progressive education and to identify their innovative potential for school development.

	Maria Montessori (1870-1952) – Italy, USA	Helen Parkhurst (1886-1973) – Daltonplan, USA	Peter Petersen (1884-1952) – Jenaplan/ Germany	Celestin Freinet (1896-1966) – France
Objectives	Responsible, autonomous person depending on individual predispositions	Responsible, autonomous person as part of a society	Individual and socially competent people	Responsible, autonomous person as part of a society with equal opportunities
Theory of children´s evolution	Development depending on individual predispositions, marked by sensitive phases	Influenced by Maria Montessori	Children´s predispositions: Movement, socialization, action, learning; Basic needs: Love, empathy, protection, responsibility, democracy	No difference between children and adults; children´s development is provided by its autonomous activities
„education"	Indirect instruction via an appropriate, well-prepared learning environment	Democratic-oriented; main principles: freedom, responsibility, cooperation, independent learning, developing social and moral competences	Education within and throughout the community	Activating and supporting individual and independent learning
„learning"	Personal development throughout well-prepared learning environment with a large amount of appropriate material	Individual, self-conducted, cooperative learning to fulfil the assignments	Education via dialogues, games, celebrating feasts and festivals. Learning in all situations, based on moral principles.	Natural and exploring learning; experiments, „realistic" work
Teacher	Instructor for the first use of materials, then supporter and coach	Author of learning material and learning tasks, then supporter and coach in special subject-based spaces	Organizer of individual and children's learning processes	Organizer and coach of individual and children's learning in cooperative form
Curricula	Focussed on the traditional curricula	Focussed on the traditional curricula	Focussed on the traditional curricula	Focussed on the traditional curricula
Methods, didactics	Age-heterogeneous work, use of appropriate learning material based on the curriculum; general theory of evolution is the main focus of learning and teaching	Self-conducted and independent work in special spaces according to individual assignments; cooperative work in free work environments	Weekly work plans as a structure of the weekly school rhythm, starting with an assembly on the first day of the week, involvement of non-school environments	Work in studios, implementing library work, democratic decisions concerning lesson plans as well as individual plans; class councils

Table 1: Overview of progressive education at the beginning of the 20th century (Eichelberger, 1997, p. 146).

Teacher Education – a Process of Deep Changes

In order to change the whole education system, one needs new ideas and the influence of a new individually-based philosophy throughout the micro-system of class and lectures, the even larger system of the individual school and the national education system including teacher education. Furthermore, individualization becomes crucial. Trainee teachers have to be aware of their strengths and talents, their personal interests and patterns and because of that, supporting systems are going to be implemented in teacher education.

An Organisation for Economic Co-operation and Development (OECD) survey shows that, in nearly all of the participating 25 countries, induction programmes for teachers after the attendance of university colleges and during their first professional years have become part of teacher education (OECD, 2014, p. 505). These induction programmes are mostly mandatory and necessary to get a permanent contract. It is obvious that much of the knowledge, the attitude and the approach students acquire during their studies will be obsolete when they start their work as young teachers. They very quickly switch into the old role models or pick up only instruments and patterns, which are easy to use in class and assure professional success (Dangl, 2014, p. 37).

However, young teachers have the obligation to develop their professionalism. Schratz and a group of Austrian experts in education mention five domains for teachers´ professionalism within a model for "developing professionalism in an international context", called EPIK, which comprehends professional awareness, reflective competences, managing diversity, cooperation and collaboration and personal mastery (Schratz, 2011, p. 25 ff). These concepts are defined as follows according to the aforementioned author:

1. Reflective competences: People must be able to reflect upon their own actions within the learning environment from an external point of view. Self-reflection has to happen during teaching (in action) and afterwards (on action). The process should combine the individual reflection and the discourse with colleagues. In a transfer process, the outcomes lead to new aspects of professionalism.

2. Professional awareness: It means the appreciation of students (and parents) as the main focus of the job and the knowledge of how to act professionally. That implies the consciousness of being an expert in education. Teachers act confidently and are aware of their competences within the educational system.

3. Managing diversity: Although teachers still dream of a homogeneous class, this will always remain fiction. Most of the instructional groups are heterogeneous, even if the differences are not obvious. Pupils differ in their gender, age, interests, gifts, multiple intelligences, social and cultural background, mother tongues, and the like. Teachers have to manage diversity by preparing different materials according to the many individuals that compose their classes. They must appreciate the

high potential that diversity offers. Managing diversity is an important paradigm of school quality.

4. *Cooperation and collaboration* is one of the most significant outcomes of social competences. It is crucial to overcome daily routine. Cooperation between teachers leads from the focus of "I and my class" to the objective of "we and our school" and enhances school quality. Collaboration means sharing work, sharing responsibility and sharing good moments.

5. *Personal mastery* (Senge, 1996): "Knowing what" and "knowing how" must be transferred into daily routine, so that teachers become masters of their own professionalism also by "knowing why" they are acting the way they do (Schratz, 2011, p. 36).

The induction programme that is to be introduced in Austria must include supporting tools for new teachers, such as the work with mentors and coaches. As teacher employment is a federal issue, there are different programmes in the different federal states of Austria. The University College of Teacher Education of Christian Churches, Wien/Krems (KPH), has recently created a special master's programme for the qualification of mentors. Mentoring must develop the self-autonomy of the newly qualified teachers (NQTs) according to the ideas of Deci & Ryan (2002). Therefore, mentors have to support NQTs based on the EPIK-concepts by observing them in their lessons, conducting meetings in small groups to exchange experiences and giving ideas but not solutions. They support NQTs' reflections and sometimes help to manage the daily routine of the job, especially in matters of dealing with parents and administrative work. The programme was evaluated during the school year of 2012-2013 on the base of a model of "offers and needs" (Beer, 2014, p. 17). The main question was how a NQT could be successful in the job during the first years, which provisions are required and what has to be provided.
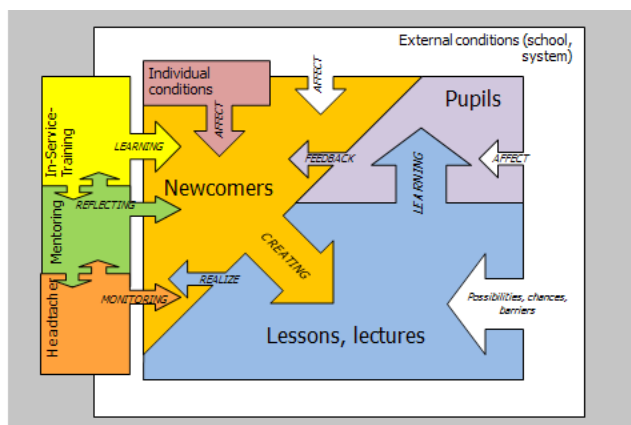

Figure 3: *Modified model of offers and needs (Beer, 2014, p. 20).*

The 2012-2013 study used qualitative interviews with the NQTs and the mentors, mentors' journals and a questionnaire for the NQTs as methodological instruments. One of the results showed that mentoring in the first years is crucial for a successful start. Although the project was run with external mentors (people that are not part of the school of the mentee), it is not evident that there can´t be internal mentors (people as members of the school-staff), too. Each of them offers different advantages: External mentors act from an outside point of view, whereas mentors from inside use their knowledge of the local system and all its needs, and thus can build bridges among the colleagues. Head teachers, who are the people in charge of the classes of the NQTs, also play a significant role in this period of time. Economists have created "onboarding" strategies (Ebenberger, 2014, p. 223), which can be transferred into school, too. The executive director, the head teacher in the case of the school, has to empower the novice teachers by using well-considered strategies of placing NQTs and providing feedback. Work with the other colleagues becomes fundamental: They often act like coaches and mentors, too; they support NQTs in their daily life. Mentoring is even more successful if it is based on interpersonal relationships, mentoring work in bigger groups is not supposed to be as efficient as the research of BEER (2014) pointed out. In small groups (two or three NQTs with their mentor) NQTs feel more secure to open up and have more chances to get in a close contact to their mentor.

The outcomes of the research show that the combination of mentoring, monitoring and assessing as intended by the future law can diminish the success of mentoring. Mentoring is successful when the relationship between both mentor and mentee is trustful, independent and based on an open mind. Apart from the implemented mentoring procedure regular in-service-courses will be mandatory in the future. The courses will combine the latest perceptions in educational theory with the NQTs´ experiences in practice. The EPIK concept will be the basis for all competences, which are to be achieved. As a result, all the steps should lead NQTs towards a successful and meaningful professional life.

Concluding remarks

The phrase "School Changes slower than Churches" by Haenisch (1991) can unfortunately still be applied. In Austrian schools, it has taken nearly a century for new ideas to become part of the educational programmes by law. The main focus on both children and teacher education is set on the individual. The age of progressive education with its protagonists Maria Montessori, Helen Parkhurst, Peter Peterson and Celestin Freinet realized the importance of freedom, autonomy and individualization, cooperation and democracy in education hundred years ago. Education has to prepare people sustainably for the future in a sustainable manner. Cooperation, individual strengths, gifts and interests, an open mind, flexibility and the motivation for life-long learning have become crucial for managing

teachers' daily life, which includes their job, too. The implementation of the New Secondary School in 2012 marks this point in children´s education. Children are no longer separated into streams, they should have access to courses and different material appropriate to their interests and their giftedness. Each child should benefit from the same educational conditions in one common school. Each child should feel empowered and should have the chance to develop its talents in a supportive learning environment. But as long as there are more types of schools for lower secondary education (New Secondary School and Gymnasium) there is still a political discussion going on. The focus on inclusive classes and the appreciation of the benefit of heterogeneous classes need flexible and motivated teachers as well as an open minded society.

New tracks are laid in teacher education, too. Induction programmes focus on the individual development towards autonomy and independently acting people. Novice teachers are accompanied by mentors. The relationship between both mentor and mentee is part of a security net for the NQTs that also includes the support of the head teacher and a number of in-service courses. So according to the EPIK-concept the novice teachers develop professionalism, reflective manners, personal mastery, competences in collaborating with colleagues and parents and most important they are able to manage the diversity of a heterogeneous classroom

The success of all these which are not really new ideas will depend on how many personal and financial resources are provided and how much autonomy will be possible at schools. But in an era dominated by a lack of budget in every ministry public evaluations get very significant. On the one hand, system changes need time to be implemented and to be successful whereas on the other hand the public very carefully studies the outcomes. But the more it is in the focus of public discussion, the more controlling the system becomes, the less progressive will it act because their promoters – the teachers – lose motivation and get insecure. Learning and teaching organizations need self-confidence, freedom and time to develop, and so do people. Therefore, it has to be seriously considered how much assessing and mentoring learning systems – both personal and organizational – need and how much controlling determines the opposite effects, and last but not least how much time will be conceded for overcoming the challenge of this system chance.

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Water in our mouth:[1]
Food metaphors
in the Portuguese language

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Abstract

This article intends to demystify the conventional approach to metaphors, which have been traditionally regarded as a mere poetic and imaginative device, as well a means for rhetorical flourish. In order to achieve this purpose, we focus on some basic considerations about figurative language (versus literal language) and the tropes, namely the simile, the synecdoche and the metonymy. From this, we introduce the approach of cognitive linguistics, especially that represented by Lakoff & Johnson (1980), that highlights the importance of metaphors in structuring and organising our thoughts and actions, enabling at the same time to understand extralinguistic reality. Having established the theoretical context, we put forth a set of metaphorical expressions in Portuguese, related to the conceptual domain of food, which are analysed in terms of their meaning and the identification of their underlying metaphor and are provided with a context taken from the Portuguese newspaper *Público*. Therefore, we aim at proving that even the most basic of areas of life, such as food, are fraught with metaphors.

Keywords: *cognitive linguistics; figurative language; tropes; conceptual metaphor theory; food metaphors.*

Introduction

Metaphors have been traditionally regarded as an instance of literary language, a trope or figure of speech in line with metonymy, synecdoche or personification. Due to the figurative and subjective nature of metaphors, they were shunned from serious linguistic concerns for many centuries. From the mid-20th century onwards, it was granted research attention and thus various disciplines have studied its role in language and culture, shedding new light on this device. Among these theories, Miguens (2002, pp. 73-74) mentions the following: linguistic theories (e.g. prototype theory, relevance theory, cognitive linguistics), aesthetic approaches (aiming to study the voluntary and artistic composition of words and other symbolic materials), cognitive (focusing on the functioning of the brain), ontological (highlighting the importance of conceptual creation by humankind) and deconstructionist theories (directed to revealing arbitrary decisions present in the conception of thoughts and concepts).

It is then worth looking at the etymology of the word itself in order to grasp its meaning and functioning. The word 'metaphor' stems from the Greek word *metaphora*, which means to transfer, transport or move to a certain place, involving a set of linguistic processes according to which specific elements or features are transferred from one object to another, in a way that the second object works as an extension of the first one. From Miguens's (2002, p. 76) viewpoint, the word *metaphora* is in itself a metaphor, a request for borrowing movement, so that a metaphor is literally a word out of place. Nietzsche (cit. Miguens, 2002, p. 76) shares the same view, upholding that all language is metaphorical by nature and thus is naturally and potentially out of place.

It is due to this heavy tradition that Scheffler (in Dormael, Spoelders & Vandamme, 1987, pp. 117-122) puts forth the 10 myths that summarise the criticisms towards metaphors:

1) the myth of falsehood – only literal propositions are true and only the scientists tell the truth;
2) the myth of embellishment – metaphors are mere rhetoric devices that can be made without and are also cognitively empty;
3) the myth of emotivity – metaphors are highly emotional and with no cognitive content;
4) the myth of suggestiveness – metaphors stimulate the association of ideas that might lead to the truth;
5) the myth of communication – communication of a purely literary thought requires the use of metaphors or it might be enabled in this way;
6) the myth of ownership – only the author of the metaphors has right over them, thus metaphors are under the author's control;
7) the myth of metaphorical truth – related to literal truth, which reflects the difference between poetic and scientific propositions, respectively;

8) the myth of constancy – all discourse is metaphorical and each word belongs to a metaphorical lineage, which means that the literal is void of meaning;

9) the myth of the formula – according to which there is a formula to decode metaphorical expressions;

10) the myth of the objectualism – metaphorical description involves the comparison of objects.

We intend to be able to refute these erroneous misconceptions about metaphors throughout our article, which will be organised into three parts. The first will deal with different approaches to the mechanisms of figurative language (versus literal language), as well as a possible view on the traditional tropes. On the second part, we will focus on the perspective of cognitive linguistics, namely in line with the work of Lakoff & Johnson and their renowned work "Metaphors we live by" (1980), their conceptual metaphor theory and the types of metaphors they put forth. At last, attention shall be placed upon the actual instances of metaphorical expressions about food in the Portuguese Language. These were gathered from numerous resources online, cross-checked with paper reference works, so as to achieve the list in Annex 1. From this list, 10 expressions were selected and analysed according to their meaning and explained in view of conceptual metaphor theory principles.

Figurative Language and Tropes

As mentioned above, metaphors are included in the context of figurative language as opposed to literal language. Despite being rather complex and evasive concepts, it is commonly accepted that the meaning attached to literal language arises from general language words used by speakers on a daily basis, whereas figurative language deliberately interferes in the literal system by means of transference, which aims at reaching a new meaning, both broader and more precise. Therefore, speakers first and foremost access the literal meaning of a word or sentence and only then do they activate the non-literal meaning, when "there is a mismatch of literal meaning with context" (Giora, 1999, p. 920), being thus optional.

The idea of transference and its various forms are termed tropes or figures of speech. Fontanier (cit. Santos, 1998, p. 190; cit. Contenças, 1999, pp. 44-45) supported the idea that the metaphor is the one-word trope, opposed to the other multiple-word tropes. In line with the idea of tropes, Hawkes (1972: p. 5) distinguishes metaphor from three similar tropes: simile, synecdoche and metonymy. In similes, the transference has already been achieved, i.e. the transfer of meaning is explained by means of "as" or "like" in English and *como* in Portuguese. For instance, "as light as a feather" = *leve como uma pena*; "eat like a horse" = *comer como um porco*[2]. In this process, the relation between the words involved becomes more visual and, due to this, it is often regarded as a lesser form of metaphors, because

it merely expresses an analogy or moves the name of an object to something that is closely associated with it.

In relation to synecdoche, this is generally seen as a lexical or lexical-semantic process based on meronymy (part-whole relationship), while metaphors and metonymies depend on different types of synonymy. If the synecdoche results from a possessive process (i.e. it has/ it possesses), the metaphor entails an intense relational process, where an identity is established. Notice the synecdoche "head of department" that in Portuguese becomes *representante/coordenador de departamento*, losing thus its metaphorical nature.

In terms of the metonymy, Halliday (1991, p. 319) argues that body parts are frequently used with a metonymical function, in which the relations established are of varied nature, such as cause, source or instrument. Kövecses (2002, p. 145) understands metonymy as a cognitive process in which a conceptual entity, the vehicle, provides the mental access to another mental entity, the target, within the same cognitive domain. The entities of vehicle and target are metonymically related, because they are close to each other in the cognitive space. Metonymies result in the transference of the name of an object to take the place of something else that is associated with it. An example is "We need a new glove to play third base", which means that a new baseball player is necessary, represented by one of the items that make up this sport's equipment – the glove.

As a result, Kövecses (2002, p. 147) considers that metonymies are not used to understand a domain, but, in fact, to mentally and cognitively gain access to a more abstract target by means of a more concrete vehicle that is available in the same domain, because the relation is one of contiguity, as is shown in figure 1.
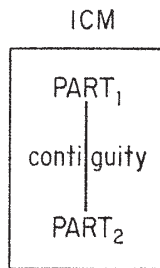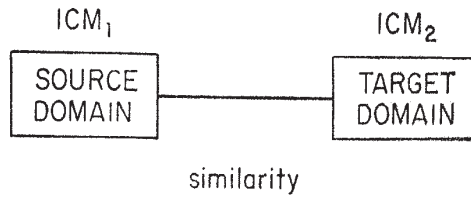

Figure 1: *Representation of the metonymical relation (Kövecses, 2002, p. 148).*

On the other hand, the same author (Kövecses, 2002, p. 147) states that the metaphorical process is established between two concepts that belong to different conceptual domains. The entities that are related in a metaphor establish a relation of similarity, which can be originated in a real resemblance or correlations perceived in experience. The main function of a metaphor is to enable to understand something in terms of something else, which means that one conceptual domain is

regarded in relation to another conceptual field, by creating systematic mappings between the elements of the source and the target (see figure 2).

Figure 2: *Representation of the metaphorical relation (Kövecses, 2002, p. 147).*

Therefore, as Martin (cit. Silva, 1992, p. 314) puts it, the metaphorical relation consists of the identity established between at least one of the semes in two different sememes[3] and the derived sememe is comparable, analogous and similar. On the other hand, the metonymical relation corresponds to the reappearance of the basic sememe in the derived sememe. The distinction between the relation of correspondence, connection and similarity will refer to metonymy, synecdoche and metaphor, respectively.

Consequently, metaphors are a means to take language from within literal language and establish a relation between two objects through the use of words with a figurative meaning, different from the traditional lexicographical meaning, thus Vilela's idea that (2001, p. 174) polysemous language stems from the metaphorical use of words. Hawkes (1972, p. 71-72) upholds that the difference between figurative and literal language is more of degree than of type of language.

Language can be defined as an organic and autonomous system that separates and classifies speakers' lives and creates reality at their own image. This is a transfer process, because language in itself is necessarily metaphorical by virtue of this replacement of reality, as Nietzsche (cit. Miguens, 2002, p. 76) points out. Hawkes (1972, p. 59) stresses that metaphors are not something special or exceptional in linguistic use or a deviance in literal language, but rather a function of language, the way in which language works. This is what Richards, quoted by Honeck (in Hoffman & Honeck, 1980, p. 31), calls "the omnipresent principle of language", since the verbal metaphor is the most basic product of the metaphorical apprehension of the world.

Metaphors appear as a way to experience facts, a way to think and live, an imaginative projection of truth. This is the distinguishing feature of cognitive linguistics, namely Lakoff and Johnson's approach, that metaphors are inseparable from language which is virtually all metaphorical, and that reality results from the metaphorical interaction between words and daily life.

Conceptual metaphor theory

In the words of Vilela (1996, pp. 324-325), Cognitive Linguistics does not intend to focus on the history of metaphor, but rather on the definition of metaphors from a linear perspective, in their relation to metonymy and synecdoche, demonstrating that these three tropes are essential for human language for putting forth new creations and as a means to enrich the processes of organising reality. As a result, cognitivists gave new life to information that was no longer new: on the one hand, linguistic structures and units make up and depend on the conceptualisation of reality, and, on the other hand, they influence this conceptualisation, which is done through the establishment of prototypes, stereotypes and similarities. There is then continuity and a relation of dependence between language and the remaining cognitive skills, e.g. conceptualisation, categorisation, memory, attention, among others.

It is in this context that Lakoff & Johnson developed their metaphor theory: they studied metaphors in light of the cognitive contributions related to the nature of the mind, being opposed to the myth of objectivism and Chomskyan linguistics. Therefore, in the words of Miguens (2002, p. 86), metaphors no longer come up as accidents with a residual interest, but metaphoricity is omnipresent and systematic in natural languages.

Lakoff & Johnson (1980, pp. 3-5) sustain that metaphors have been traditionally regarded as a tool for poetic imagination and rhetorical flourish, being an issue of figurative language. However, apart from being a linguistic issue, metaphors are ultimately a question of thought and action, since metaphors are involved in all aspects of life, language, thought and cultural acts. Our conceptual system, according to which we think and act, is fundamentally metaphorical. Because communication is based on our conceptual system, language comes up as a strong evidence of this system. The essence of metaphors is based on the understanding and experience of one thing in accordance to another, thus concepts and activities are structured metaphorically, as is language.

In line with Lakoff & Johnson, Vilela (2001, pp. 174-175) believes that the meaning of words is not equivalent to an objective set of events or entities; our cognitive system relates such a set in a systematic manner. Linguistic categorisation does not depend on the distinctions observed in the world, but on the metaphorical and metonymical structuring of our world perceptions. It is this conceptual organisation of knowledge and the world that shapes the categorisation and lexicalisation of the human language.

Vilela (2001, pp. 175-178) elaborates on this by stating that the cognitive structure of human understanding first conceives the universal lexicon of space, which will then acquire time meanings. Knowledge is structured according to the extra-linguistic reality and not randomly scattered. Accordingly, metaphors show up as the main engine in semantic change, working between domains, between vision and knowledge, between space and time, and this crossing between one domain

and the other is achieved through cognitive mappings. Metaphors are conceptual sources that are essential for the explanation of semantic analysis, both synchronic and diachronic.

Categorising and conceptualising the extralinguistic world and human feelings and behaviour imply the lexicalisation of processes that are established as physical objects. For instance, some psychological states are explained by means of the vocabulary of the human body, which is, for Silva (1992, p. 317), a powerful means for metaphorical expansion and attraction, as the Portuguese philologist Boléo states in his work "A Metáfora na Língua Portuguesa Corrente" (1935).

Lakoff & Johnson (1980, pp. 7-9) offer other examples: for instance, "Time is money" (*Tempo é dinheiro*), because both money and resources in general are limited, thus providing a way to conceptualise time, which is inevitably connected with a specific cultural understanding. Despite the fact that metaphorical structuring is systematic, by allowing us to understand one concept in relation to another, it highlights certain aspects and necessarily hides others that might be inconsistent with the metaphor in use; otherwise, the concept would not be understood according to another, but it would be the other.

Another example Lakoff & Johnson (1980, pp. 66-67) refer to, which is related to the previous one, is "Work is a resource" (*Trabalho é um recurso*). Neither example is felt as metaphors, because they naturally result from the way the western industrial culture and society regard work in their obsession with quantifying everything and reaching well-defined targets. These two structural metaphors are complex, making use of two simple ontological metaphors that enable work and time to be quantified, regarded as spent and wasted and to which one attributes money value. These features inherent to time and work highlight aspects which are central in our culture, hiding others not so relevant.

The abovementioned examples introduce two of the types of metaphors Lakoff & Johnson (1980) put forth: on the one hand, ontological metaphors allow to group, identify, quantify and rationalise data coming from human experience, some of which may be concrete objects and, on the other, structural metaphors are grounded in systematic correlations within our experience, which enable to "conceptualize what a rational argument is in terms of something that we understand more readily, namely, physical contact" (p. 49). These metaphors provide the opportunity for approaching concepts and abstractions as if they were manageable entities. Vilela (1996, p. 324) presents the example of the container-metaphor, according to which objects and concepts are projected as being inside or outside.

On the other hand, Vilela (1996, pp. 329-330) also explains orientational metaphors, which enable to organise concepts through their basic spatial relations inside their own conceptual system, offering them a space orientation and, from this physical element of the orientational metaphor, create a set of transferences and applications to other domains. Notwithstanding, these spatial orientations are

not arbitrary; they are based on the cultural and physical experience of individuals, because they inevitably vary from culture to culture.

As far as the English language is concerned, table 1 shows the cultural implications of the following metaphorical spatialisations according to Lakoff & Johnson (1980, p. 14):

UP	■ Conscious ■ Good ■ Happy ■ Having control or force ■ Health and life ■ More ■ Rational ■ Virtue	DOWN	■ Bad ■ Being subject to control or force ■ Emotional ■ Less ■ Sad ■ Sickness and death ■ Unconscious

Table 1: Examples of orientational metaphors according to Lakoff & Johnson (1980: p. 14).

In terms of the Portuguese language, Vilela (2002, p. 75) also presents some examples, such as *o atleta está no pico da forma* ("the athlete is on top form"), *o atleta está em baixo/fora de forma* ("the athlete is out of shape"), *ele está agora em queda livre* ("he's in free fall"), *ele anda sobre as nuvens* ("he's got his head on the clouds"), *ele está no sétimo céu* ("he's on the seventh sky").

Lakoff & Johnson (1980, pp. 25-26) uphold that understanding experiences according to objects and substances enable to select specific aspects of reality and regard them as uniform entities and thus the most basic of human experiences lead to the development of orientational metaphors. The same happens with ontological metaphors, since people's experiences with physical objects offer the basis for a variety of these metaphors, i.e. for different ways of facing events, activities, emotions and ideas. Ontological metaphors allow to consider, for example, inflation as an entity that can be quantified, has a cause, can be understood or acted upon, e.g. "Inflation has robbed us of our savings" (*A inflação roubou-nos as poupanças*).

In other words, ontological metaphors approach human experiences in a rational manner, in such a way that they are not felt as being metaphorical. Lakoff & Johnson (1980, pp. 27-31) refer to the container-metaphors that encompass land areas (because land-ownership is a basic human instinct, each person is a container, whose surface is surrounded and understood as inside/outside), visual field (what one sees is inside the visual field, supporting the concept of land-ownership), events and actions conceptualised as objects and activities and states as substances. The following try to illustrate the container-metaphor: "The ship is coming to view"; "I couldn't do much sprinting until the end"; "He entered a state of euphoria".

Lakoff & Johnson (1980, p. 10) also mention the conduit metaphor, according to which a speaker places ideas or objects into words that work as containers that are then sent through a conduit to a listener that retrieves these ideas/objects out

of the words/containers. An example of this type of metaphor is "linguistic expressions are meaning containers".

Considering the omnipresence of metaphors in conceptualising and structuring reality, as well as in shaping the language accordingly, the concepts of structural, ontological and orientational metaphors become of the utmost importance in the analysis of linguistic instances, which we shall attempt to achieve while looking into the Portuguese food expressions.

Portuguese food metaphors

In this last part, we intend to analyse a set of Portuguese metaphorical expressions that focus on food. The first step was to gather these instances from various resources available online (e.g. NaturaPúblico, a corpus online based on the articles about environmental issues taken from the Portuguese newspaper *Público*) and cross-check them with Barata (1989) dictionary. After listing approximately 90 expressions, they were organised into categories, namely physical states, cooking spaces, ingredients, culinary states, actions, body, objects and dishes/meals. To these expressions, some proverbs were also added from the abovementioned corpus online, which will not be the object of our analysis, but are identified as such in Annex 1.

From our initial list, we selected a group of ten expressions to illustrate the metaphorical load that characterises Portuguese food expressions, frequently used in contexts different from the ones that created them. Their meaning is defined, in accordance to Barata (1989), and contexts are provided, which were taken from the Portuguese corpus online CETEMPúblico. These contexts intend to demonstrate that these expressions, though initially only used to refer to food, have evolved in such a way that acquired vitality and flexibility, being productively used in general language.

batata quente nas mãos (hot potato on one's hands)
- → meaning: have a difficult issue in hands or pass it on to someone else (Barata, 1989).
- → context: [par=ext6270-pol-93a-1][4] "Se tal acontecer, e tudo indica que sim, Londres ficará com uma **batata** quente nas mãos – a implementação do texto saído das negociações em Hong Kong, à revelia dos legisladores locais.".
- → metaphor: structural metaphor, because the physical effect of having a hot potato on one's hands is used to conceptualise a thorny situation.

comer/ dar/ vender gato por lebre (eat/give/ sell cat for hare)
- → meaning: be deceived by appearances or be tricked by someone (Barata, 1989).

→ contexts: [par=ext27057-pol-94a-1] "Se os independentes querem fazer política, o que é saudável e bem-vindo, então não devem começar por copiar o pior que têm os políticos, não podem começar por tentar <u>vender **gato por lebre**</u>."; [par=ext75858-soc-98a-1] "A este propósito, Jorge Figueiredo, responsável pela entidade certificadora, referindo-se à fraca qualidade de alguns queijos produzidos na região, afirmou que «o principal responsável do `**gato** <u>por lebre</u>' são os industriais», acrescentando que há quem faça queijo com leite que chega de Espanha, ao qual adiciona leite em pó."

→ metaphor: structural metaphor, since the situation of being fooled by things or people is understood by means of a swap of animals.

cuspir no prato que deu de comer (spit on the plate that feeds you)

→ meaning: be ungrateful for something that was given to you (Barata, 1989).

→ context: [par=ext977730-pol-92a-2] "Se é difícil conter a indignação perante o tom e a substância das declarações do ministro australiano – um autêntico «**cuspir** <u>no prato do anfitrião</u>», como lhe chama o socialista José Lamego nesta página –, já o lançar de culpas sobre Deus Pinheiro se afigura excessivo e injusto."

→ metaphor: structural metaphor that enables to conceptualise being ungrateful in terms of the physical action of spitting onto a plate of food.

dar/crescer água na boca (make your mouth water)

→ meaning: to strongly desire something (Barata, 1989)

→ contexts: [par=ext816216-clt-95b-2] "Este `The Complete no Noise Reduction' <u>deixa uma certa **água** na boca</u> e é um dos bons álbuns feitos em 1995."; [par=ext783254-clt-95a-1] "«Dust be diamonds» (kazoos, guitarras acústicas «folky», harmonias vocais – com as duas meninas do grupo, Rose Simpson e Licorice, no seu papel de falsas ingénuas – sem lógica visível, as entoações escocesas de Robin conferindo às palavras ressonâncias de <u>fazer crescer **água** na boca</u>, teatro, pura magia), «Sleepers, awake!», harmonização a quatro vozes «a capella», no mais genuíno espírito folk de um projecto como «Morris on», de Ashley Hutchings, e «Mr. & Mrs.»"

→ metaphor: structural metaphor that represents the strong desire for something in accordance with the physical reaction of water in one's mouth due to the sight of delicious food.

encher chouriços (fill chorizos or the tripe that envelop the spicy meat)

→ meaning: do something that is worthless and a waste of time (Barata, 1989).

→ contexts: [par=ext581768-clt-97b-1] "Acontece muitas vezes, noutras ocasiões, os jornalistas não terem imagens e verem-se obrigados a «**encher** chouriços**»: falam, sem dizer nada, tentando substituir a ausência de imagens"; [par=ext516096-clt-97b-2] "Alguns dos apresentadores de televisão mais queridos do público revoltaram-se contra a «arrumação da casa» introduzidas pelo odiado Birt Jeremy Paxman, prestigiado «pivot» da BBC2 e entrevistador de língua afiada, explicou que a nomeação de cinco «super-editores», encarregues de todos os noticiários de rádio e televisão era como «transformar as notícias numa <u>fábrica de **encher** chouriços</u>."

→ metaphor: structural metaphor – traditionally chorizos are made in autumn and winter in rural areas by filling up tripe with the meat remainders from people's cattle and poultry. Perhaps because it is a time-consuming activity, it is used to refer to situations that are a waste of time or worthless.

entornar o caldo (spill the broth)
→ meaning: spoil the harmony; change to a worse situation; make a serious mistake (Barata, 1989).
→ context: [par=ext114492-soc-93a-1] "Se um «peru» é apanhado na área das «galinhas», ou vice-versa, é certo que o «**caldo** <u>se entorna</u>» e a «panela» só volta a ficar direita com a chegada da polícia, «inimigo» comum dos dois grupos, que assim aproveitam a ocasião para se reconciliarem"; [par=ext185398-clt-93a-2] "Então um desses cantores `operários' virou-se para mim e disse: `Ah, tu és daqueles gajos que vêm aqui sacar massa à classe operária...' A partir daí <u>entornou-se o **caldo** todo</u>."

→ metaphor: structural metaphor, because the comparison with spilling the broth is made to conceptualise what occurs when one, for example, says the wrong thing and spoils the harmony or changes to a situation which is even worse than the previous one.

estar no ponto (be at the setting point)
→ meaning: reach a state of high quality (Barata, 1989).
→ context: [par=ext163570-clt-soc-92b-1] "Depois, a equipa médica espera – os embriões podem manter-se congelados durante anos – até a mulher **estar no ponto** do seu ciclo natural que lhe permite tentar nova gravidez."
→ metaphor: structural metaphor that compares the setting point for jams and jellies with reaching the highest point of one's ability or life.

farinha do mesmo saco (flour from the same bag)
→ meaning: have or share the same flaws (Barata, 1989).
→ context: [par=ext122110-pol-95b-1] "Há já 20 anos que ouvimos essas promessas, mas só quando vir a chave na mão é que acredito, é tudo **farinha** <u>do mesmo saco</u>», comenta, abanando a cabeça."

→ metaphor: structural metaphor that enables to understand people that have the same flaws, such as politicians, according to the flour that comes from the same bag.

fome de dinheiro (hunger for money)
→ meaning: yearn for money (Barata, 1989).
→ context: [par=ext271808-clt-94a-2] "Francisco Sande Lemos, da Unidade de Arqueologia da Universidade do Minho, a par de reconhecer que «a arqueologia urbana é uma área em expansão», frisou, por outro lado, que ela «tem também uma **fome** <u>insaciável de dinheiro</u>» – preocupação sublinhada por Nuno Alpoim que foi mesmo ao ponto de afirmar que o "Orçamento de Estado deveria dotar uma parte para a área da arqueologia".
→ metaphor: ontological metaphor, because the expression attempts to quantify an abstract concept, which is money, depicting it by means of another abstract, yet physical state, which is hunger.

ser pão duro (be stale bread)
→ meaning: used to qualify someone who is mean (Barata, 1989).
→ context: [par=ext597212-pol-94b-3] "E o mundo rural, na sua áspera autenticidade, é um **pão duro** de mais para as entranhas da urbe."
→ metaphor: ontological metaphor, since it aims at explaining an abstract feature – being mean and tight-fisted – by means of its comparison with stale bread, hard to break.

At the end of this lexical and metaphorical analysis, it is possible to refute beyond a shadow of a doubt the traditional idea that metaphors are merely used in literary and poetic texts with the function of embellishing them or in rhetoric contexts to flourish speech. Metaphors are pervasive in language and life itself, enabling to conceptualise extralinguistic reality by structuring and organising thoughts and actions. The examples presented above allowed to have a glimpse of the power of metaphors in language by means of a basic area in people's lives – food. The transference of meaning from one conceptual domain to another throw light on areas which might be difficult to understand or conceptualise, such as abstract concepts or features. Consequently, most metaphors we identified in our set of expressions were structural and ontological metaphors.

Conclusion

It is now important to recover Scheffler's (in Dormael, Spoelders & Vandamme, 1987) misconceptions mentioned in the introduction, which concern the traditional way to perceive metaphors. We consider that it is now possible to refute most of these myths, based not only on the theoretical framework provided by Lakoff &

Johnson's approach, but also on the analysis of Portuguese metaphorical expressions from the conceptual domain of food.

Concerning the myth of falsehood, the truth is not a feature that is restricted to literal statements, nor are metaphorical expressions necessarily false, since the translation of these expressions by their literal equivalent leads to the loss of their cognitive content, not to mention the complex semantic relations that are established. Related to this myth, we can also refute the myth of embellishment, because metaphors are not mere rhetorical ornaments used in literary language. It should be recalled the fact that the contexts we offered with the explanation of the expressions were taken from the Portuguese newspaper *Público*, which emphasised the idea that these expressions convey concepts, organise human thought and action and enable the development and evolution of knowledge – thus the denial of the myth of emotivity. Another myth that we can refuse is that of ownership, because metaphors are not under the control of their individual authors, but are rather dependent on the cultural and social contexts that created them, maintained with these a close relation.

Nonetheless, we can reinforce some of Scheffler's myths, namely the myth of suggestiveness, communication, objectualism and metaphorical truth. In terms of the suggestiveness, metaphors possess a high level of suggestion, the so-called power of insight, that allows for the creation of mental images potentially conducive to the apprehension of their meaning. As Cormac (1985) puts it, the understanding of a metaphor depends more on its visual image than on the linguistic understanding of its components, being usually non-compositional. As far as communication is concerned, the use of metaphors may facilitate communication, especially in specialised languages, what Kocourek (1982) names terminological metaphors. The myth of metaphorical truth is related to the myth of falsehood and, in this particular point, the cognitive approach provides the answer: metaphors not only convey true thoughts, concepts and ideas, but also structure and organise our conceptual system. At last, the metaphorical relation is not merely a relation of similarity between objects, but also among entities, concepts, experiences and events.

All in all, metaphorical expressions surpass the simplistic conception of rhetorical and poetic ornament to reach a wider dimension grounded on their cognitive function. Our conceptual system according to which we think and act is fundamentally metaphorical, as we demonstrated through Lakoff & Johnson's cognitive approach.

End-of-text Notes

[1]   This is a literal translation for the Portuguese idiomatic expression com água na boca.
[2]   Notice the fact that the English and Portuguese similes make use of a different animal, thus reflecting a different conceptualisation of the world, as envisaged by cognitive linguistics.
[3]   In this context, we understand sememe as a unit of meaning that corresponds to a morpheme, whereas seme is a single unit of a sememe.
[4]   The sequences between square brackets that precede each context are the code that identifies the concordance provided by CETEMPúblico.

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Annex 1 – List of metaphorical expressions and proverbs in Portuguese
1. A bom ou mau **comer**, três vezes beber (proverb)
2. A carne é fraca
3. A conversa não chegou à cozinha
4. À falta de capão, cebola e pão (proverb)
5. À míngua de pão, boas são as tortas (proverb)
6. Abre o olho que assam carne (proverb)
7. Apetite sexual
8. Babar-se por alguém
9. Barriga cheia/ merenda comida, companhia desfeita (proverb)
10. **Barriga** cheia, cara alegre
11. **Barriga** farta, pé dormente
12. Batata quente nas mãos
13. Bem mal ceia quem come de mão alheia (proverb)
14. Bem mal farás que andes e não comas (proverb)
15. Bocado comido não apanha amigo (proverb)
16. Cada um come do que faz/gosta
17. Carne que baste, vinho que farte, pão que sobre (proverb)
18. Carne sem osso, proveito sem trabalho (proverb)
19. Chorar sobre leite derramado
20. Come caldo, vive em alto, anda quente, viverás longamente (proverb)
21. Come e folga, terás boa vida (proverb)
22. Come para viver, não vivas para comer (proverb)
23. Comer com os olhos
24. Comer como um abade
25. Comer gato por lebre
26. Comer o pão que o diabo amassou (proverb)
27. Comer e coçar, mal é começar (proverb)
28. Cozinha sem salsa é como jarra sem flores (proverb)
29. Cozinhar em banho maria
30. Cuspir no prato que deu de comer
31. De dar água na boca
32. De meia tigela

33. Depois de eu comer não faltam colheres (proverb)
34. Depois de fartos, não faltam pratos (proverb)
35. Do prato à boca se perde a sopa (proverb)
36. Docinho de coco
37. Dos cheiros o pão e do sabor o sal (proverb)
38. É pelo estômago que se conquista
39. Em casa onde não há pão, todos ralham e ninguém tem razão (proverb)
40. Encher chouriços
41. Entornar o caldo
42. Estar no ponto
43. Farinha do mesmo saco
44. Fome de dinheiro
45. Grão a grão enche a galinha o papo (proverb)
46. Guarda que comer, não guardes que fazer (proverb)
47. Guardado (está / estava) o bocado para quem o há de comer (proverb)
48. Ir com muita sede ao pote
49. Manteiga derretida em focinho de cão
50. Mel, se o achaste, come o que baste (proverb)
51. Menino farto não é comedor (proverb)
52. Mesa sem pão é mesa de vilão (proverb)
53. Mudar como da água para o vinho
54. Muito come o tolo mas mais tolo é quem lho dá (proverb)
55. Não alimentes burros a pão-de-ló (proverb)
56. Não metas a mão em prato onde te fiquem as unhas (proverb)
57. Nem pão quente, nem vinho que salte ao dente (proverb)
58. Nem sempre galinha nem sempre sardinha (proverb)
59. Mem só de pão vive o homem (proverb)
60. O que não mata engorda (proverb)
61. Os comes e os bebes
62. Os olhos pedem mais do que a **barriga** aguenta (proverb)
63. Panela velha é que faz comida boa (proverb)
64. Pão quente: muito na mão e pouco no ventre (proverb)
65. Pão, pão, queijo, queijo
66. Para a fome não há pão duro (proverb)
67. Para boa fome não há mau pão (proverb)
68. Pela farinha se conhece o moleiro (proverb)
69. Plantar batatas
70. Puxar a brasa para a sua sardinha
71. Quando não há pão, come-se broa (proverb)
72. Queijo com pão faz o homem são (proverb)
73. Quem comeu a carne que roa os ossos (proverb)
74. Quem não arrisca não petisca (proverb)
75. Quem nunca comeu melado, quando come se lambuza (proverb)
76. Quem tarde vier comerá do que trouxer (proverb)
77. Se mal jantas e pior ceias, minguantes as carnes e crescentes as veias (proverb)
78. Se não queres **engordar** come e bebe devagar (proverb)
79. Se tens sardinha, não andes à cata de peru (proverb)

80. Sede de poder
81. Ser pão duro
82. Ser um banana
83. Ser um pão
84. Ter mais olhos que barriga
85. Trocar alhos com bugalhos

How Polish foreign language education and its evaluation look in the light of the European solutions for gymnasium – the lower secondary school

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Abstract

The article shows the state of Polish education in gymnasium – the lower secondary school. It introduces the reader into the concept of formative assessment and also the European Language Portfolio – the tool which can strongly support self-regulated learning. This paper offers a review of the literature in the field of Common European Framework of Reference for Language, the European Language Portfolio and Self-Regulated Learning. At last, it elicits the areas of language learning in which work with the European Language Portfolio can have its positive results.

Keywords: *European Language Portfolio, Common European Framework of Reference for Language, Evaluation, Formative and Summative Assessment, Gymnasium.*

Introduction

When it comes to the obligation of teaching one or more languages, the language teaching policy of the European Union goes towards taking into account the global public interest. It seems that everybody speaks or wants to use their language to communicate, work abroad, do business or even just hang out with each other. In making this decision, the Council of Europe must also regard the need for realising three fundamental objectives of language education in Europe, also formulated in the documents of the Council of Europe (Beacco & Byram, 2002). These are as follows: the pragmatic, which is to enable to communicate effectively and exchange ideas in Europe; the intercultural, which is to promote tolerance; and the socio-political objective of promoting linguistic and cultural diversity. In view of the objectives set out above, it is important to pay attention to how Polish language education and its evaluation look in the light of the European solutions for gymnasium, which stands for the lower secondary school.

This article is organised into the following main parts: the presentation of the Polish gymnasium in the light of the CEFR, the description of formative assessment and its features, as well as the European Language Portfolio, and the reason to support self-regulated learning in Polish Gymnasium. In the first part, we will have a look at the definition of Gymnasium, which is commonly recognised in Poland as a certain phase in Polish education system; however, it may not be that obvious to teachers and students from different parts of the world. The further part of this component is devoted to the explanation of what foreign language teaching assumptions in Gymnasium are. Subsequently, we will also analyse the detailed description of students' proficiency level, which triggers the question of the role of formative assessment in Polish gymnasium.

This part defines the difference between formative and summative forms of evaluating gymnasium students' progress. In this part of the article, we will also find out about an essential arrangement of the classes to be able to evaluate students in the formative way. The article consists of the component related to the construction and description of the European Language Portfolio. The ELP has been chosen as an underestimated mechanism for formative assessment and simultaneously a tool strongly inscribed into self-regulated learning. The last part explains the reasons why the development of SRL should be supported in Polish gymnasium, providing five categories in which SRL is reflected.

Polish Gymasium in the light of the Common European Framework of Reference for Languages

First of all, there is a need to describe the education system in Poland. This may be defined as the organisational structure that provides, in particular, the right to education through training, education and care (Pilich, 2009, pp. 29-37). Among the organisational units of the education system, we can specify the following sectors:

Primary School, Gymnasium and Secondary School. According to a Greek-English Lexicon (Liddell & Scott, 1889), the term of "Gymnasium" is the latinisation of the Greek noun γυμνάσιον (i.e. gymnasion), which means "gymnastic school", in pl. "bodily exercises" and generally "school". Nowadays, the meaning has changed to the form which determines the level of education that constitutes a bridge between primary school and secondary school. The word "gymnasium" is also used for the same education stage in different countries, such as Austria, Denmark, Estonia, Sweden, Germany (Dabaene, 2007, p. 135).

Polish secondary education is compulsory, including non-profiled education for pupils aged 13-15 years, which ends with a nationwide exam. When it comes to teaching languages, the most popular one is English. A basic step in planning the educational process is to define its objectives. They are clearly set out in the curriculum and adopted in the school curriculum. It shows teachers' interpretation of the essence of education in the school system, the degree of the identification and the contextual determinants of teaching in the school, as well as teachers' role and that of students in the teaching process. The goals that are set by the gymnasium teachers can be easily inscribed into three main complementary tasks. According to the regulation of the Minister of National Education (2012), they are as follows: fluent use of the foreign language, preparation for the final exam and the shaping of attitudes. The process of preparing the students for the exam should be well thought out and spread over the three years of the gymnasium, so that the entire learning cycle is not turned into mechanical exercise tasks corresponding to the type of exam tasks, while it should also be devoted to achieve the target language competences specified in the core curriculum.

Brzezińska (2005) claims that the main goal of foreign language teaching at the gymnasium stage is to achieve a level of fluency in ensuring efficiency in linguistic communication. This means the ability to understand and build up the correct linguistic expressions in written or oral forms, as well as the skill to select relevant language to the specific situation. It is obvious that the degree of validation depends on the intensity of learning and assimilation of the material by the students in the classroom and at home.

An important element of teaching is to develop strategies and techniques for self-learning and self-esteem among students, as well as to build up the skills of cooperation in groups and teams. By being in contact with the group, they learn to interact in a team, as well as tolerance and friendliness to the peers who struggle and seek help if they have a problem. All these skills are essential for the development of the young adult. Language learning can be linked also with different school subjects, which can be implemented with the help of teaching materials and teaching aids offered by the core curriculum. This approach is commonly described as an eclectic or interdisciplinary one.

The teacher's task in implementing the curriculum is to help students find the most effective learning techniques and support each student in trying to use their abilities. A very important issue in the learning process is also to create a friendly atmosphere in a classroom full of kindness and partnership both between teacher and student and among students. Preference for cooperation rather than competition creates a favourable climate for language acquisition and for handling it, and allows students to learn from each other, rather than only from a textbook or teacher. By treating students flexibly and supporting them, the teacher is able to create a situation in which each of them offers something for everyone. To achieve this, the teacher should be prepared to adjust the varied ways of working and sometimes take the control role while students work in pairs or in groups. Flexibility is allowed in the selection of the material as well as its gradation. Therefore, also depending on the students' progress, the teacher can restrict or expand certain topics. In order to make best use of the results of their work, students should take an active part in lessons and work on their own at home, thus perpetuating the knowledge and skills acquired in school.

Secondly, it is worth looking at how the final exam is adjusted to the standards of the Common European Framework of Reference for Language (CEFR or CEF), which is a guideline used to describe achievements of learners of foreign languages across Europe. The CEFR has been developed by the Council of Europe. The first version of CEFR was created in 1995, subsequently, in 1997 and 1998; there were updated versions and the final one appeared in 2001.

The CEFR divides learners into three broad divisions that can be further divided. The CEFR describes what a learner is supposed to be able to do in reading, listening, speaking and writing at each level.

level group	level	level name	Description
A	A1	Breakthrough or beginner	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.
			Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has.
			Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.
	A2	Way stage or elementary	Can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment).
			Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters.
			Can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.
B	B1	Threshold or intermediate	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc.
			Can deal with most situations likely to arise while travelling in an area where the language is spoken.
			Can produce simple connected text on topics that are familiar or of personal interest.
			Can describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans.
	B2	Vantage or upper intermediate	Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation.
			Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party.
			Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.

C	**C1**	**Effective Operational Proficiency or advanced**	Can understand a wide range of demanding, longer texts, and recognise implicit meaning.
			Can express ideas fluently and spontaneously without much obvious searching for expressions.
			Can use language flexibly and effectively for social, academic and professional purposes.
			Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.
	C2	**Mastery or proficiency**	Can understand with ease virtually everything heard or read.
			Can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation.
			Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in the most complex situations.

Table 1: *The language levels according to the Common European Framework of Reference for Language (Council of Europe, 2011).*

The Council of Europe assumes that the process of relating the exams to the levels of proficiency is included in three essential components: specification, standardisation of the mark and empirical verification (Martyniuk, 2007, p. 91). The first element refers to the analysis of the exams according to CEFR standards. The second one is concerned with taking the same criteria into consideration by the examiners in terms of the level of proficiency in written and oral tasks. The last component checks statistically whether the results of a particular exam confirm the expected level of achievement by the CEFR. Polish equivalent of the CEFR which is known as "Europejski System Opisu Kształcenia Językowego (ESOKJ)" shows clearly that the final gymnasium examination is adjusted to A1/A2 level according to the CEFR (ESOKJ 2003, p. 35). The person using the language at this level understands sentences and frequently used expressions related to areas of everyday life. The person can communicate in routine, simple communication situations requiring a direct exchange of information on familiar and routine matters. He can easily describe their origin and the environment in which he lives, as well as moving matters related to everyday needs. (ibid, 2003, p. 35)

Considering the context described above, it is relevant to scrutinise the way student's assessment is carried out and how it should be undertaken.

Formative Assessment and its features

The ability to diagnose the learning process is crucial. Identification of the needs and the causes of students' learning difficulties or the reflective analysis of the whole

process is the foundation of every action and therefore education should occupy an important place in the development of teaching skills. Polish language teachers have coped well with the diagnosis of students' skills through tests of language competence as Komorowska (2013) emphasises, who is an expert in the field of language teaching and the author of numerous publications on relevant evaluation.

However, her research shows that global trends in this area are intended to be used in school practice, not only tests, but also non-testing assessment tools. Polish schools have a lot to do in this area. One such tool, indicated as important, is the European Language Portfolio. According to Komorowska (2013), there is a need to support the training of language teachers in such a way that the diagnosis be actually treated as a form of assistance in the "early detection of problems, identifying weaknesses, strengths discovery or identifying the ranges of well mastered".

Assessment should be a tool or a mechanism which has a supportive function for valuing student's achievement and thus plays a significant role. It is commonly known that students may better respond to being complimented on their progress; however, over-praise may lead to "praise junkies" (Kohn, 2001). This term refers to the moment when praise blinds their real and actual progress and students get too addicted to approbation. Thus, assessment has to be handled with subtlety. Incompetent process of assessment can bring about a negative effect.

Marking is one of the cells that builds up a complex and comprehensive process of teaching and learning. To construct an appropriate and balanced method of evaluation, we need to take into consideration some other relevant activities. They should mainly cover pre-test activities, practical sides of achievement for example anticipation journals, concept maps, interest surveys, and finally evaluating the results.

It is easy to pinpoint the fact that, in Polish gymnasium, teachers are interested in constructing tests in order to collect marks. This sort of attitude does not contribute to enhancing the process of education. Student assessment must be inextricably linked to the preparation process as well as the evaluation process. Consequently, teachers who are responsible for the teaching process in gymnasium are obliged to be familiarised with the core curriculum document. This apparently informs the teachers about gymnasium students' competences and, at the same time, clarifies how to diagnose learners' proficiency level, in order to place them in a suitable group. If we take into consideration the standards proposed by the CEFR, formative assessment seems to be an appropriate form of grading students' progress. We understand assessment as a system and a process in line with what Piegzik (2007, p. 75) upholds. While summative assessment aims to summarise the knowledge gained by the student at the end of the learning process, formative assessment is to accompany the process of learning and support it.

According to The Organisation for Economic Co-operation and Development (OECD) (2005), formative assessment is frequent, interactive evaluation of the

student's progress and understanding of the obtained material, so as to be able to determine how the student is to continue learning and how to teach him or her in the best way (ibid). By looking at this definition, it is easy to realise that formative assessment includes some type of process. Prior to lesson planning, teachers must know what they intend to achieve. It means they cannot be unrelated to the objectives they want to cover with the students during the lesson unit. The objectives should be present in a coherent and clear way as, at the end of the level, the teacher is supposed to check whether the points have been covered. This will not be possible if students misunderstood their teacher's goal at the beginning. Student must know what exactly will be taken into consideration in the evaluation process. Teachers themselves or together with the students should establish criteria for evaluation. Instead of using summative marks, teachers' evaluation should focus on commenting students' work.

It is a well-known fact that to provide students with good feedback is difficult; however, it always ought to include such components: specification and appreciation of good points of the student's work, a note about what needs to be corrected, support of the way students should improve this particular task and finally pinpointing how students should be working on. The most important fact is that feedback must be closely related to the evaluation criteria set before performing the task. Yet another significant aspect of the feedback is to identify the strengths of the student's work. Assessment should give students' a chance to take action, which will become improved work through the teacher's guidance, since it is re-checked with comments. Such students' assessment provokes as well as encourages them to take up the challenge, confront their own weaknesses.

Summative assessment includes only information about whether the students have mastered the satisfaction of the material, and therefore it applies just to students themselves. In contrast, formative assessment is an evaluation of the student's work. Teachers play a key part in the planning and implementation phase of the teaching-learning process. They are the ones that make choices on which approaches, pedagogical strategies and tools they use or do not use. In the ideal scenario, according to Aaltonen (2012, pp. 19-20), the prerequisites are in line with the objectives, and the objectives, teaching methods and evaluation practices are compatible with each other. This type of consistency constitutes high-level pedagogical thinking. Attention should be given to using various methods and measures, in order to have a comprehensive plan. Among some of the few formative assessment instruments the European Language Portfolio is the one which has been accredited by the Council of Europe, as shall be explained below.

The European Language Portfolio

The idea of Language Portfolio was born in the Department of Modern Languages in the Council of Europe. Its first versions were developed in the 1990s by

the team involved in the development of the European Framework of Reference for Languages: Learning teaching, assessment and testing in 1998-2000. In 2000-2002, the Council of Europe Accreditation Committee approved nearly forty language versions of the European Language Portfolio (EPL). There were ten top countries with their own European Language Portfolio, among them Switzerland, from which it drew inspiration, and still other countries have been inspiring, such as France, Russia, and Germany. Currently, subsequent versions of the EPL are being prepared, among them the Polish. Each country officially reports their portfolios to the Accreditation Committee of the Council of Europe, which holds the copyright on behalf of the European Language Portfolio, and the construction of this document. Only the portfolios accredited by the Council of Europe are used in the formal and informal educational system of the country and in Europe.

The ELP is a tool supporting the autonomy of the students, an interesting tool for self-assessment of language skills and cultural experience. It was adapted to the Polish educational context many years ago; it has very slowly found its place in school practice, being underestimated by teachers and unknown by students.

Each and every ELP consists of three closely interrelated parts: Language Passport, Language Biography and Dossier. Each one has its place in the course of study and bears its own function. In terms of the Language Passport, it presents a profile of the language and the balance of intercultural experiences of its holder. With a standardised format, the document is recognised throughout Europe. It contains information about the Council of Europe and the passport, the owner, his/her language portrait, language profile, self-esteem, self-table, information of how long s/he has been learning the language, as well as in what way learning languages takes place and finally how you can certify the acquired knowledge, experience and skills. As far as Language Biography is concerned, it is a personal record of events related to language learning and also personal reflection on the student's own learning strategies, needs and objectives. At last, Dossier is a briefcase containing a selection of work and documents, a type of the owner's portfolio. In the Dossier, learners collect their best work, diplomas, certificates of participation in competitions, exchanges, e.g. between schools, projects, language courses, tours, travels, summer jobs abroad, among others.

Students can fill in the Biography and Dossier pages at home and they should decide on what information will be included in the portfolio and how often they will publish them. The teacher will present portfolios to the students, who are acquainted with the ways of working in a class, and offer them the task to prepare for independent work at home. The rest depends on the students alone.

The application of European Language Portfolio is successful if the users work in accordance with the following assumptions. Mainly teachers and students, as well as their parents, need to be aware that everybody can use several languages. Therefore, according to Głowacka (2004, pp. 21-31), successful communication in

everyday situations is not always dependent on proficient speaking and writing; getting language experience begins before attending school and it doesn't finish within graduating from school; students' assessment expressed by a mark may not express students' real level of proficiency; self-learning requires the practical knowledge of how to assess their own progress.

Reasons to support Self-Regulated Learning in Polish Gymnasium

The teachers who have had any practical experience with the ELP can answer this question in various ways. However, many researchers appreciate and perceive this tool as a means to enable all learners to learn languages. For Pamuła-Behrens (2013), the ELP is one of the methods to create a different perspective on language learning and teaching languages, to build the image of a language teacher launching the portfolio is a long process; however, if learners start building up their portfolios as early as possible, it can be a threshold for the process of changes in Polish education. Students who are engaged in using the ELP develop a self-regulated learning (SRL). SRL is described by Ormrod (2009: p. 105) as a process for taking control of and evaluating one's own learning and behaviour. SRL is inextricably linked to autonomy and learners can control the process of learning, individually.

The self-regulated learning processes do not appear automatically in learners. Students become more proficient self-regulators as a function of cognitive development and learning. Zimmerman and Martinez-Pons emphasised that young students increase their use of planning, sequencing and goal-setting (1990, pp. 51-59). Thus, Self-Regulated Learning must be inscribed into cognitive development and learning. Students should be taught how to evaluate their learning process and how to use the opportunities to do so. Normally, students are being evaluated for by their teachers. But self-regulation is a cyclical process in which students self-regulate, check their progress, and adjust their approach as needed. There is a need to provide students with chances for self-evaluation because they are not used to doing it autonomously. Gymnasium students can be still considered as young students, especially at the beginning they are twelve, thus the self-monitoring should be kept simple such as by having them use a check list or count how many problems they have completed. With development, students can implement more elaborate self-regulation strategies.

It is important to state that, considering the development of students' autonomy, interaction with other students should not be left behind. In other words, interaction does also serve as the condition for language acquisition alone. The Russian psychologist Vygotsky (1962) (cit. Ellis, 2002, p. 48) provided an insightful elaboration of the concept of the zones of proximal development. There are two ideas called "motive" and "internalisation": the first one specifies the goals of the task, but the second term refers to the problem solution in support of an "expert", who offers "scaffolding" and then internalises the solution. In other words, Vygotsky

(1962) claimed that the development of language goes through the zones of proximal development with the help of a mediator. The expansion must go gradually from the first zone to the second one (Ellis, 2002: 48). According to this theory, it is easy to acknowledge that the European Language Portfolio as a tool inscribed into self-regulated learning focuses on the triadic interaction among the person, their behaviour and the environment. Zimmerman et al. (2008, pp. 166-183) detailed three significant features of self-regulated learning. They are as follows: self-observation (monitoring one's activities); self-judgment (self-evaluation of one's performance) and self-reactions (reactions to performance outcomes).

Successful learners are able to implement multiple learning strategies across tasks and adjust those strategies as needed to facilitate their progress towards their desired goals (Paris & Paris, 2001). Apparently, it is significant to realise that the vast majority of students in general, as well as these who attend Polish gymnasium, typically do not have a large repertoire of learning strategies at their disposal (van de Broek *et al.*, 2001). Students need to acquire different learning strategies, such as *rehearsal strategies, elaboration strategies, organisational strategies, comprehension-monitoring strategies* and *affective strategies*. Zimmerman and Schunk (2001, 2008) directly link learning strategies to self-regulation. According to these researchers, self-regulated students are those students who are metacognitively, motivationally, and behaviourally active in their own learning processes and in achieving their own goals. Suggestions for developing self-regulation in the gymnasium students' education classroom follow (ibid):

- Cognitive strategies are inscribed into the process of learning strategies which can be specific to a domain or content. When it comes to the activities, they should be designed in a way to help the gymnasium students practice comprehension activities. These type of strategies promote the development of performance in the final exam, because they enrich the vocabulary and examination skills as well as improve the grammar

- The metacognitive component is associated with declarative knowledge, which is the knowledge about oneself as a learner, procedural knowledge, the one about learning strategies and other procedures, and finally conditional knowledge that means why and when to use a particular strategy. The aim of the self-regulated learning is for these strategies to first become visible and eventually automated for the gymnasium learner. The role of this component is to improve the independent learning skills by enabling them to develop the ability to plan work, mechanisms of self-control and self-esteem, understand their own learning, aware of the use of the most effective learning strategies, evaluate their own progress and take responsibility for their own learning, be independent and solve problem creatively, search, organise and use information from a variety of sources, enhance the degree of independence by teaching how to use

dictionaries and reference materials, learn to take responsibility for the results of actions taken and their consequences, shape attitudes and readiness for independent systematic work on language and to use English language as a tool for communication, cooperate with others in pairs or groups and develop tolerance for differences and towards other people.

- The last component is represented by motivation which consist of *self-efficacy* and *epistemological beliefs.* Self-efficiency is understood here as being convinced enough to accomplish the task (Dinsmore, Alexander, Loughlin, 2008, pp. 391-409). When it comes to concrete educational objectives, gymnasium students will be able to develop their cognitive curiosity and intellectual activity; additionally, they will be capable of develop their socially desirable attitudes and behaviour, develop a sense of self-esteem and belonging to the local community, the nation, the state as well as the European community (Schraw, Crippen,Hartley 2006, pp. 111-139). Epistemological beliefs are the ones about the natural origin of knowledge. Mainly, this is to shape a positive attitude to national traditions, holidays and customs and also to develop an attitude of tolerance, openness and curiosity towards other cultures and the ability to communicate with peaceful people of another culture. Great self-regulators build up the abilities and propensities to be successful learners, showing viable learning procedures, exertion, and tirelessness. The key for gymnasium teachers is to see how to encourage and train these abilities in all students. Self-regulated learning strategies help to plan learners for deep rooted learning and the critical ability to exchange aptitudes, information, and capacities starting with one space or setting then onto the next. Thus, self-regulation could definitely become a general strategy in gymnasium but what students self-regulate will vary depending whether they are reading passages in text, writing essays, or solving problems.

Conclusion

No matter what the level of education is, foreign language teachers are not always aware of the huge impact that testing techniques have on the learning process. Their assessment determines to a large degree how our lessons look like as well as what and how to teach students. It strongly depends on how significant amount of power we give to the designers. We have found that the central part of the idea of formative assessment in Polish gymnasium is the regulation or adjustment of learning and teaching by interactive and informal ways of evaluating students' progress. Nevertheless, the implementation of formative assessment into the official marking and grading system in Polish gymnasium needs some empirical research which seems to be a huge challenge for the scientist. The application of the European Language Portfolio as a new form of self-assessment as well as assessment is definitely a way

of changing Polish gymnasium. To make it real it is a must to check whether this type of school is ready to begin this practice.

Thus, as Seidel & Walters (1997, p. 127) stress, some further research should be conducted in order to answer the following questions: 1. Where does a school begin? 2. Do all schools have to incorporate all of these practices? 3. Is a teacher (or a few teachers) ready to start work with portfolios if the staff isn't prepared (or interested) to sign on as a whole? The part devoted to self-regulated learning clearly provides the reader with the categories of learning which may be regulated by the learners themselves. Taking into consideration the core curriculum, we can be sure that the development of these fields is necessary to support the continuity of later education. However, the mentioned categories are important and some further scrutiny is needed to ascertain to what extent we can allow our students to monitor the process of learning independently as the lack of teacher's control may have a pernicious effect.

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Foreign language anxiety and adult EFL learners: Sources, effects and what can be done about it

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Abstract

Language researches have long been aware that anxiety is often associated with language learning and can be a major obstacle in delivering a successful oral performance. In the 1990's it was confirmed that language learning process may trigger a "complex of self-perceptions, beliefs, feelings and behaviors related to classroom language learning" (Horwitz et al., 1991, p. 31) known as foreign language anxiety. In the following years researchers revealed that language anxiety was not only limited to a classroom setting, but it also was observed in out-of classroom language use, often impairing a successful oral performance, and negatively affecting learners' confidence, self-esteem, or even in case of adults, self-concept.

This study aimed to address sources of language anxiety such as speaking in front of the others, negative evaluation of one's own language skills, learner beliefs about age and language learning, just to mention a few. Following a

two-directional approach to language anxiety, the study also tried to define the effects (cognitive, behavioral, physical and emotional) it could have on oral, out-of-classroom performance of adult learners. Next, a number of strategies language teachers can apply to help learners overcome the feeling of anxiety were introduced.

Keywords: *language anxiety, oral performance, adult learner*

Introduction

Sources of language anxiety

Language researchers have long been aware that anxiety is associated with language learning and can be a major obstacle in learning to speak another language. In the Oxford Dictionary of Psychology the term "anxiety" is defined as "a state of uneasiness accompanied by dysphoria (feeling of uneasiness, discomfort) and somatic signs and symptoms of tension, focused on apprehension of possible failure, misfortune, or danger"(Colman, 2006,p. 46). It consists of four interrelated components: physiological, behavioral, cognitive and emotional (Vasa & Pine, 2004, Seligman, Walker & Rosenhan, 2001).

For many years, studies adopted various perspectives on the relationship between anxiety and language performance. From the classical Spielberger's (1983) distinction between state anxiety (transitory condition experienced prior to test taking, public speaking, communicating in a foreign language) and trait anxiety (predisposition of an individual to become nervous in different situations), complemented with situation-specific anxiety (probability of becoming anxious in a specific context, MacInyre and Gardner, 1991a), social anxiety ("a state anxiety resulting from the prospect or presence of interpersonal evaluation in real or imagined settings" [Leary, 1983, p.67]) , narrowing down to a performance anxiety (arises from a performance-based setting when an individual thinks of potential negative evaluation of their performance, Piechurska-Kuciel, 2008) and including stage-fright (fear of public speech, highly self-focused), communication apprehension (anxiety about anticipated or actual oral communication with others, Daly, 1991), test anxiety (resulting from evaluative character of testing situation, often perceived as threatening one) and finally the definition of a foreign language anxiety was presented.

Foreign language anxiety is defined as "a distinct complex of self-perceptions, beliefs, feelings and behaviors related to classroom language learning arising from the uniqueness of the language learning process" (Horwitz *et al.*, 1991, p. 31). According to MacIntyre and Gardner (1991b), language anxiety is situation-specific (e.g. related to a classroom context) and should be discriminated reliably from

other types of anxiety, as students, who experience no anxiety in general, may become anxious in a language context. Foreign language anxiety comprises three performance components: communication apprehension, test anxiety and fear of negative evaluation. It should be pointed out that some researchers presented anxiety in a second language learning referring to a similar phenomenon as foreign language anxiety, and therefore gradually these two terms were coined under one term, language anxiety (MacIntyre and Gardner, 1991b).

Research carried out in the area identified a great amount of in- and- out of language classroom situations which can trigger language anxiety, e.g. public performance in a foreign language (Young, 1991), perceived lack of proficiency in a language (Horwitz *et al.*, 1991), learner beliefs about language learning (Price, 1991), classroom procedures and teacher's attitude (Price, 1991), just to name a few.

According to Woodrow (2006) the major stressor causing impairment in speaking performance was actually speaking in front of the group. Learners experience apprehension and worry about others' opinion concerning their oral performance (Young, 1991). This fear may be related to a negative evaluation and fear of losing face in front of others, as speaking publicly pertains to an evaluative situation in which performance is monitored or can even be criticized (Ohata, 2005b). Furthermore, highly anxious learners worry about making mistakes, being laughed at, making fool of themselves or being ridiculed by other students (Price, 1991). Adults, in particular, seem to be concerned with mispronouncing and not being able to speak at a native-like level: "You feel frustrated because you're an interesting adult and you sound like a babbling baby" (Price 1991, p. 105). Some adults believe that it is better to say nothing unless it is said correctly (Horwitz et al., 1991).

Perceived lack of proficiency was found to correlate significantly with emergence of language anxiety. Learners are concerned about lack of vocabulary and inability to retrieve appropriate words and expressions on the spot, especially when their performance was monitored (Ohata, 2005b). Accordingly, Horwitz et al. (1991, p. 31) assert that because "complex and non-spontaneous mental operations" are required to communicate in foreign language, thus any performance in the L2 is likely to challenge one's self concept as an effective communicator and lead to negative feelings of self-consciousness, fear or reticence. Adults, in particular, perceive themselves as "intelligent, socially adept individuals" (Horwitz et at., 1991, p. 31). This self-concept might be challenged due to limited competence in L2. Additionally, unless people feel proficient and comfortable about communicating in a foreign language and culture, they might experience anxiety, hesitancy or incertitude (Young, 1991). Thus, according to Woodrow (2006), inability to express oneself as well as not being able to understand when spoken to may lead to experience of language anxiety.

Another factor, according to Price (1991), Young (1991) and Horwitz et al. (1991) that may play a role in language anxiety occurrence are learner beliefs. Price

(1991) found that learners believe learning requires a special aptitude. Young (1991) indicated that learners sometimes have unrealistic beliefs such as time they need to learn a language or that they have to develop excellent accent and pronunciation. Horwitz et at. (1991) added that some students believe that nothing should be said in foreign language unless it is said correctly. What is more, many adults tend to believe that they would never acquire language at a desired level due to their age and as a result they develop negative perception of their own intellectual competence (Onwuegbuzie *et al.*, 1997). It can be inferred that learner's convictions about language learning may stem from student's life history and past experiences related to school such as failures, low sense of academic efficacy and inability to meet the demands (Piechurska-Kuciel, 2008).

Language anxiety, therefore, may emerge from classroom procedures and teacher's attitude. Young (1991) found that some instructors believe they must be drill sergeants, and intimidate their students into learning. Fast-paced lessons, large amount of material covered and no time to process the input significantly increased anxiety (Von Worde 2003). The same author also reported that non-comprehension can be anxiety-provoking. Furthermore, error correction methods may trigger anxious feelings and result in fear of negative evaluation and thus fear to speak a foreign language. Young (1991) asserted that mistakes corrected by a teacher in an embarrassing way in front of the students may have debilitating effect on student self-esteem and motivation to continue learning the language. Similarly, Von Worde (2003) reported that learners became anxious when they were reprimanded for mistakes and corrected before they had an opportunity to finish answering a question. Turula (2002) stated that teachers often correct students in an explicit way, which carries the meaning of disapproval, mock and is accompanied by impression of insincerity. Therefore, learners who are corrected in that way may feel more anxious, less able than those who receive implicit correction, are given the chance of self-correction. According to Price (1991) teachers who discussed the importance of making mistakes in order to learn were considered as those helping mitigate the feeling of anxiety in learners.

Adult learners have well-defined goals and expectations about learning. They join language courses because they want to grow professionally and personally. Current job market requirements in Poland force them to continue learning and gain many new skills, especially foreign languages. They also travel more often, thus effective communication seems indispensable. However, they bring prior history and experiences from the past to the class, and these were not always positive memories. Sometimes, just the single fact that they must be back to school may undermine their self-esteem and self-concept as an adult. Therefore, language teachers should be aware that language anxiety is likely to emerge in this particular group of learners and have adverse consequences on learning, performance in EFL, motivation (Liu & Chen, 2015), just to name a few.

Effects of language anxiety

When discussing the effects of language anxiety, it should be noted that the relationship between anxiety and performance can be seen from the perspective of relationship between stress and performance described by means of the Yerkes-Dodson law (cited in Piechurska-Kuciel, 2008). According to the Yerkes-Dodson law arousal caused by stress can either have a facilitating or debilitating impact on performance. The relation between arousal, herein anxiety, and performance is presented as a U-shaped function (see Fig. 1 below).
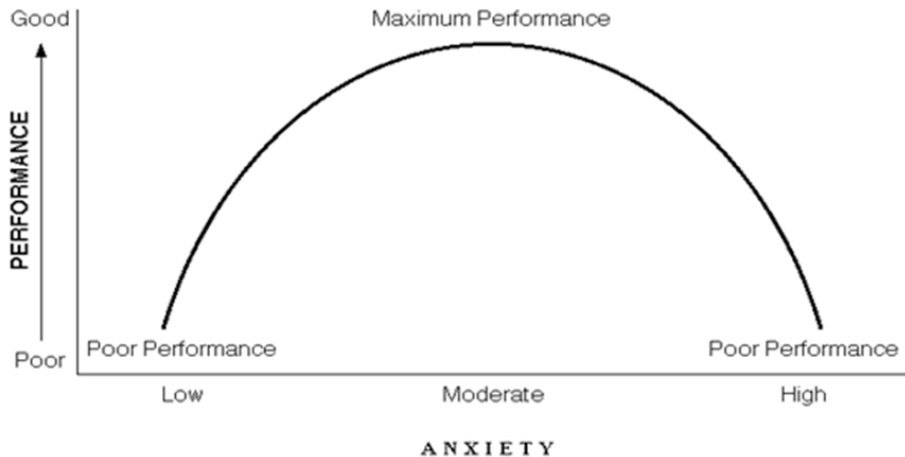
Figure 1: Inverted-U of the Yerkes-Dodson's law.

As can be seen from Figure 1, a moderate anxiety level may enhance performance, whereas as anxiety level increases or decreases, the performance may deteriorate. Alpert and Haber (1960) referred to this function of anxiety as facilitating or debilitation. Facilitating anxiety affects performance positively, in other words it improves performance, while debilitating anxiety hampers it, and thereby is associated with poor achievements (Alpert and Haber, 1960). Scovel (1991, p. 22) pointed out that in educational settings "facilitating anxiety motivates individual to 'fight' the new learning task and gear indulgence behavior, whereas debilitating anxiety motivates individual to 'flee' the new learning task, and stimulate avoidance behavior." Various researchers found that a language anxiety can have a detrimental effect on language learning and performance (Horwitz *et al.*, 1991, Scovel, 1991, Price, 1991, MacIntyre and Gardner, 1994, MacIntyre, 1999, Von Worde, 2003, Ohata, 2005b). The effects have been classified as cognitive, physical, behavioral, academic, social and personal.

As far as cognitive outcomes of language anxiety are concerned MacIntyre and Gardner (1994) identified negative effect of language anxiety on performance stages, i.e. input, processing, output. Anxious learners may fail to "take in" (encode) new

material, store and assimilate it (organize) and retrieve it when needed. In other words, highly anxious people form a mental block and language acquisition may not progress, time needed to process of new material may significantly extend (MacIntyre and Gardner, 1994) and they can experience "freezing" while trying to communicate and thus not reflecting their knowledge (Horwitz *et al.*, 1991). Furthermore, anxious learners exhibit physical and behavioral responses as sweating, tapping foot, clammy hands, playing with objects, and sometimes develop avoidance behaviors such as not showing up for a class, finding excuses not to use the language, over-studying, just to name a few (Scovel, 1991; Von Worde, 2003; Ohata 2005b).

Language anxiety has also been found to negatively correlate with academic achievements, such as language course grades (Horwitz *et al.*, 1991; MacIntyre, 1999) and has negative social and personal outcomes, e.g. losing dignity, being perceived as incompetent and silly (Price, 1991), less socially attractive, low self-confident and thereby climbing slower on a career ladder (Daly, 1991).

Strategies to mitigate language anxiety

In a view of recognized sources and effects of language anxiety, many strategies and programs have been developed in order to reduce negative effects of language anxiety on learning and performance. These embrace addressing language anxiety directly, developing language speaking skills, dispelling erroneous beliefs about language learning, accuracy (and errors) and /or age, and adopting classroom procedures which are not anxiety-triggering.

According to Mejias et al. (1991) and Arnold (2005b) systematic desensitization, skill training and cognitive modification might help learners relax in the anxiety-provoking situation such as public speaking.

As far as systematic desensitization is concerned, the learner is taught how to relax in the anxiety-provoking situations, and thus how to deal with the presence of the anxiety stimuli. It is done through visual imagery where an individual imagines oneself being in a safe and peaceful retreat, and self-verbalization (Arnold, 2005b). Mejias *et al.* (1991) and Arnold (2005b) posit that systematic desensitization is a situation-specific treatment that can be used to deal with stage fright, public speaking and anxiety experienced in a language context.

Skills training can be considered crucial to improving students' performance and alleviating anxiety. Mejias *et al*, (1991)) assert that students perform poorly in communication situations because they lack necessary skills, and therefore the method they suggest focuses solely on developing communicative repertoire of the speaker. And lastly, cognitive modification (restructuring) is suggested by Mejias *et al.* (1991) as an effective method to change learner's cognitive appraisal and renounce erroneous beliefs.

Learners hold certain negative beliefs regarding their aptitude, accuracy or age in relation to language learning and their change may be considered as one of strategies

aiming at alleviating language anxiety (Horwitz *et al.*, 1991). Anxious learners are encouraged to recognize that their negative beliefs are irrational, and restructure them into positive perceptions, self-talk and interpret them in a realistic way (Foss and Reitzel, 1991, Rice cited in Piechurska-Kuciel 2008). Following Oxford and Crookall's (1991) strategy learners could familiarize with errors in a humorous way: "encourage students to take an amusing look at errors and to realize that they are not taboo and that they contribute to learning" (Crookall & Oxford, 1991, p. 147).

Some scholars suggested changing classroom procedures and making the learning context less stressful and anxiety-free. Young (1992), Daly (1991), Von Worde (2003) suggested that students should not be required to speak when not ready. What is more, research provided evidence that exposing anxious students too much may provoke heightened levels of anxiety and inhibit their performance. Thus Crookall & Oxford (1991) and Ohata (2005a) recommend that the teacher should provide more group work and fun activities in the classroom where language anxiety is present. Furthermore, teacher - learner interaction and error correction can play an important role in mitigating the levels of anxiety. Public ridiculing and humiliation should be avoided when correcting learners' errors and before the tests are administered they should have clear specifications, familiar formats and criteria for marking (Dornyei, 2007). In anxiety-free environment teacher is a counselor, motivator and facilitator (Ohata, 2005a).

There are a number of teaching methods which are considered effective in language anxiety reduction. Krashen (cited in Young 1992) described Suggestopedia as a method which has a positive impact on learning process and makes classroom setting a more comfortable and low-anxiety place. Similarly, Community Language Learning is a method where learners become members of a community - their fellow members and the teacher - and learn through interacting with the members of the community. The main focus is on development of oral proficiency, and learning takes place collaboratively. Learners encourage and help each other. The teacher assumes the role of a councilor to students' difficulties including language anxiety and provides safe environment in which the learners can learn and grow as their energies are directed to the tasks (Richards *et al.*, 1997).

Research
Purpose of the study
The aim of this study was to identify language anxiety sources and effects it has on language use (phase 1) among adult EFL learners. Next, provide them with a training in selected language anxiety coping strategies (phase 2), and finally evaluate the effectiveness of the strategies applied (phase 3).

Participants

20 adult learners of English as a foreign language participated in the initial stage of the study. The sample consisted of 14 females (n=14), and 6 males (n=6), aged between 25 and 54 (mean= 38,8), who have been learning English for the average 8.9 years, in the current intermediate-level course for the average 1.7 years as individual learners.

Next, 10 participants were selected on the basis of results obtained from the questionnaire for the phases 2 and 3. This sample consisted of 10 learners; 6 females (n=6) , and 4 males (n=4), aged between 33 and 54(mean=37,2).

The samples consisted of owners of mid-size companies and employees in high managerial positions. They used English for negotiations, business-related travels, preparing reports, delivering presentation, communicating with other branches abroad, attending meetings with potential clients.

Tools (Phase 1)

For the purpose of the study, Language Use Anxiety Questionnaire (LUAQ) was devised on the basis of Horwitz et al.'s (1991) Foreign Language Anxiety Classroom Scale (FLACS), and Studenska's (2007) Foreign Language Anxiety Inventory (FLAI). The questionnaire consisted of 50 items rated on a 3-point scale where 3 stood for 'often', 2- 'sometimes' and 1 –'rarely; and it comprised groups of factors such as evaluation of one's own language skills (16 items), performing in front of the others (7 items), learner beliefs (5 items) and physiological, cognitive and behavioral reactions (22 items). The total score was 150 points.

Strategies (Phase 2)

Strategy training included six activities aiming at alleviating learners from the feeling of language anxiety: *accepting errors* based on Crookall & Oxford (1991) Mistakes Panel and Speaking with Errors, both activities aiming at familiarizing learners with errors and "encouraging them to take an amusing look at errors and realize they are not taboo and that they can contribute to learning (Crookall & Oxford, 1991, p.147). *Learning conversation functions* following Mejias et al.'s (1991:97) assertion that explicit skills training and developing learner's speaking repertoire in oral situations should decrease their anxiety. The third strategy – *preparing for presentation* – consisted in training presentation skills, providing learners with presentation guidelines, and advice on how to deal with feeling of anxiety experienced prior to delivering the speech. The fourth strategy aimed at *changing learner beliefs*. It consisted of activities restructuring negative beliefs related to age and learning, as well as supporting the strategy with selected examples of research on this relation. The next strategy called *Agony Aunt* related to popular magazine help columns, where people describe their problems and receive answers to them. This strategy engaged participants to help each other with the problem of experienced anxiety, develop a sense of community and, as Crookall & Oxford (1991) stated,

try together to overcome that problem. Last strategy – *visualizing* – consisted in guiding learners through images related to anxiety-triggering situations from the least to the most anxiety-provoking, and managing the situations successfully. The technique which uses visualization to reduce phobias, fear, tension and various types of anxiety is called systematic desensitization (Arnold, 2005b, p. 273).

Evaluation (phase 3)

The questionnaire was devised to collect self-report feedback from the participants about the effectiveness of the strategies applied in phase 2. It consisted of four questions : a) which strategies the learners participated in; b) rating the effectiveness of the strategies 1-not effective, 2-effective and 3-very effective; c) future application of strategies to deal with anxious feelings 1-I do not think so, 2-maybe, 3-for sure; d) open question about other strategies to cope with language anxiety.

Results

Language Use Anxiety Questionnaire

20 learners completed Language Use Anxiety Questionnaire in order to identify the sources and effects of language anxiety among them. The total score was 150 points. There were 10 participants within this group who exceeded 100 points on LUAQ and were therefore considered anxious learners (the highest score was 140, the lowest 101).

Points	No.Participants	% of the sample
100-150	10	50
85-99	7	35
50-84	3	15
Total:	20	100

Table1: Scores obtained from LUAQ. They were further invited to participate in strategy training in Phase 2.

Language anxiety was greatly caused by performing in front of the others (80%) followed by negative evaluation of one's own language skills (75%), and beliefs held by participants about learning (60%). Majority of learners (75%) recognized cognitive effects of feeling anxious.

Factor	No.Participants	% of the sample
performing in front of the others	16	80
evaluation of one's own language skills	15	75
learner beliefs	12	60
physiological, cognitive and behavioral reactions	15	75

Table2: Sources and effects of language anxiety.

As far as performing in front of the others is concerned, the participants reported that they felt self-conscious (80%) and anxious (70%) when they had to speak English in front of the group. Their anxiety was also related to the fear they would be laughed at when spoke English (70%) and would not able to show their real value (knowledge) when presenting in English (50%).

The data obtained from LUAQ showed that many members of the sample negatively evaluated their own language skills. These comprised mostly the perception that others spoke better than them (75%), they felt embarrassed when they committed errors in English (50%), or were scared to start a conversation in English.

The third group of factors which contributed to the occurrence of language anxiety comprised erroneous learner beliefs such as they would never attain a satisfactory level in English (75%), and that they needed more time to learn English than their younger colleagues (50%).

As regards physiological, cognitive and behavioral reactions, the subject indicated that they could not utter a word when they were about to perform in English (60%), their mind went blank when they had to say something in English (50%), and had problems to understand when someone spoke English to them due to nervousness (50%).

Evaluation questionnaire
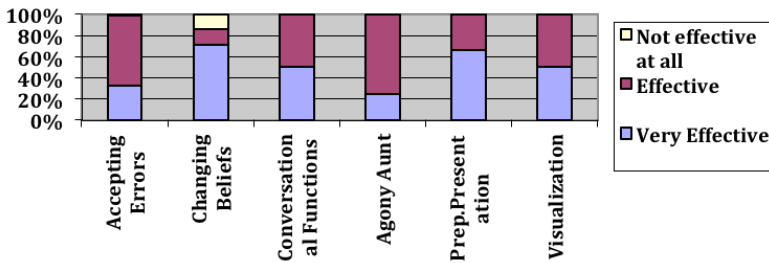
Figure 3: *Effectiveness of strategies in percentage terms.*
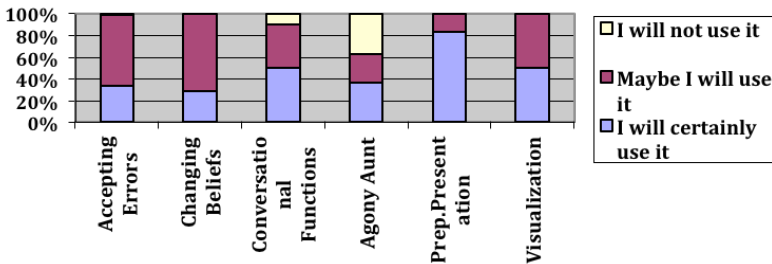
Figure 4: *Future use of skills gained from strategies in percentage terms.*

Results obtained from the evaluation questionnaire on the effectiveness and future application of language anxiety coping strategies indicated that *Accepting Errors* (no=9)[1] strategy was considered very effective in coping with language anxiety by over a half of the participants (66%) and would probably be used it in the future (70%). As far as *changing learner beliefs* (no=7)strategy is concerned 72% of participants found it very effective, and declared they would probably use the knowledge gained from this strategy in the future. As regard *learning conversational functions* (no=10) strategy, 50% of participants indicated it was very effective and the same amount declared future use. The results obtained from *Agony Aunt* (no=8) strategy showed that 75% found it effective. Sharing learning problems with others and trying to solve them together in the future was declared by 37% of subjects. As far as *preparing for presentation* (no=6) strategy is concerned, 66% of the subjects perceived it as very effective. High score was obtained for the future use of skills acquired from this strategy and indicated that 83% certainly would refer to them. When it comes to *visualization* (no=6) strategy, 50% of participants found it effective and very effective respectively. When participants were asked whether they would use visualization strategy in the future, 50% responded that 'for sure.'

Discussion

Language anxiety was found to stem from situations in which learners have to perform in front of other people. Woodrow (2006) found it as a major stressor causing problems in communication. Anxious learners worry about other people's opinion (Young 1991) and fear of losing face, as public speaking is a subject to evaluation or even criticism (Ohata, 2005b). This study also confirmed that notion. Language anxiety emerges when people should perform in a foreign language in front of audience and they realize they cannot show their real value. This may also be related to a perceived lack of proficiency and limited competence in L2 (Young, 1991). Adults tend to worry about the fact they lack enough skills and knowledge to communicate effectively (Price, 1991, Ohata, 2005b, Woodrow, 2006), even though this may only be a subjective underestimation of one's own competences, leading eventually to the experience of language anxiety. Some learners worry excessively about speaking with errors, and fear that others will notice them.

The fear of committing errors might result from negative school experiences, where more importance was placed on accuracy than fluency. This notion requires a further investigation in Polish educational setting. Adult learners often shared anecdotes from school on unpleasant error correction procedures, which resulted in their block to use foreign language effectively. Therefore, adoption of techniques which familiarize anxious learners with the nature of errors may be helpful in dispelling their error-related fears. To sum up, adult learners find practising lan-

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[1]   The number of learners participating in a given strategy

guage skills and preparing for oral performances an effective tool to mitigate their language anxiety.

Learners also hold certain beliefs that learning a foreign language requires a special aptitude (Price, 1991), and that they are too old to acquire language at a desired level (Onwuegbuzie et al., 1997). Others believe they need more time to learn a language than their younger colleagues. These beliefs may trigger anxious feelings. Helping learners to reformulate their negative perceptions and beliefs, develop a more positive self-talk and boost learner's self-esteem (Mejias et al., 1991) may influence their motivation and feeling of competence (Foss and Reitzel, 1991). Furthermore, dealing with anxiety in a direct way (e.g. *Agony Aunt* letter exchange) as well as promoting learners' collaboration to overcome the problem together might be an effective way of mitigating anxious feelings,

Besides, regarding in- and out-of classroom situations, which can trigger emergence of language anxiety, studies have also shown the effects that language anxiety has on learning and performing in a L2. These comprise physiological, behavioral, emotional and cognitive outcomes. According to MacIntyre and Gardner (1994) language anxiety can have a negative effect on performance stages, i.e. input, processing, output. Learners complained they had difficulty understanding what others spoke to them, their mind went blank and could not utter a word or express themselves at a desired level due to anxious feelings. In this light, both learners and teachers are encouraged to apply mental techniques such as *visualizing* or relaxation to evoke positive images about performance and its outcomes (Arnold, 2005b), as well as prepare learners explicitly.

Conclusions

Language anxiety has been mostly discussed from the perspective of a classroom setting, and young, junior high and college learners. There is little research into the relationship between language anxiety and EFL adult learners. This study attempted to fill this gap. It was confirmed that speaking in front of the others, usually people of higher status (e.g. boss, supervisor), negative evaluation of one's own language competences, fear of committing errors, beliefs that age can be an obstacle to learn the language at a desired level may all lead to experience of language anxiety, and in result to a cognitive impairment during learner's performance in a foreign language.

Admittedly, this study has limitations in terms of sampling, (small number of participants, who additionally may not be typical representatives of the population (individual learners, business owners, etc.) what makes it difficult to generalize the findings. Nevertheless, the small number of participants enabled the author to adopt an individual approach to each of them, and obtain a better insight into their perceptions and needs.

Furthermore, the tool designed for the purpose of this study was based on subjective accounts of perceptions related to language anxiety (Horwitz et al.'s FLACS

and Studenska's FLAI) and did not take into consideration other variables, e.g. participants' L2 history, current life situation, etc. which would add more to the understanding of language anxiety.

In conclusion, I would like to note that many adults cannot be successful foreign language users unless they are trained to manage their language anxiety. Attentive teachers, lecturers or educators should provide their anxious learners with assistance in coping with anxiety. Last but not least, never give up on your learners but aim high!

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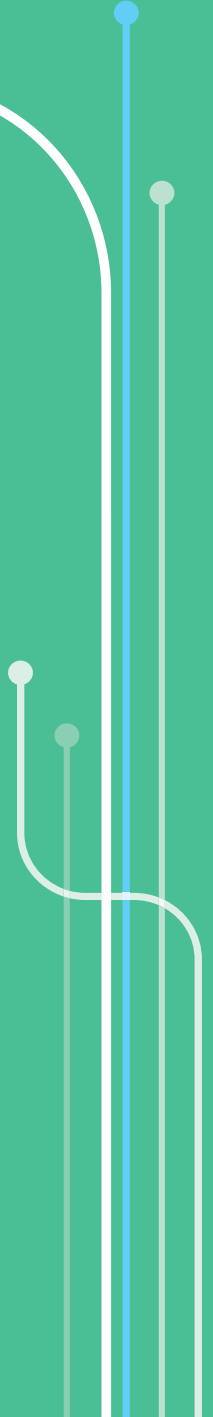
Synthesis and applications
of chiral sulfoxides

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Abstract

Numerous examples show that enantiomers of a given compound can exhibit different biological activities. The asymmetric synthesis provides an access to the enantiomerically pure compounds (or mixtures with an excess of one enantiomer) for basic biomedical studies, and demanded by the pharmaceutical, cosmetic, and agrochemical industries. This review focuses on the methods of preparation of nonracemic sulfoxides and examples of their various applications in asymmetric synthesis as chiral substrates and inducers, organocatalysts or in complexes with different metals.

Keywords: *asymmetric synthesis, chirality, enantiomers, stereoselectivity, sulfoxides*

1. Introduction

Chirality is an important term, especially for chemists. An object is called chiral when it cannot be superimposed on its mirror image. They are different like our right and left hand (the term "chiral" originates from the Greek χειρ - hand). Many chemical can exist in two forms which are non-superimposable mutual mirror images - these isomers are called enantiomers (the traditional term "optical isomers" is also used). Most chiral molecules contain a stereogenic center, typically a carbon atom with 4 different substituents (figure 1). It is worth mentioning that chirality should not be confused with asymmetry – a chiral molecule can exhibit a rotational symmetry!
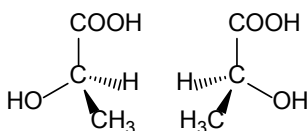
Figure 1: Two enantiomers of lactic acid.

In the living world, many important biomolecules: sugars, nucleic acids, and proteins, contain chiral components (amino acids, monosaccharides) and are also chiral. This property is a key feature for their three-dimensional structure and thus for their metabolism and function.

Various notation systems are used to describe enantiomers. Since the two enantiomers rotate plane-polarized light in opposite directions, the sign of optical rotation (+ for dextrorotatory isomer and - for levorotatory one) can be given to distinguish them. Another system, traditionally used for sugars, amino acids and their derivatives, is based on the spatial arrangement of substituents of the particular stereogenic center and the compound can be assigned to the D or L series. Finally, Cahn-Ingold-Prelog priority rules can be applied to assign „R" or „S" absolute configuration to each stereogenic center (figure 2).
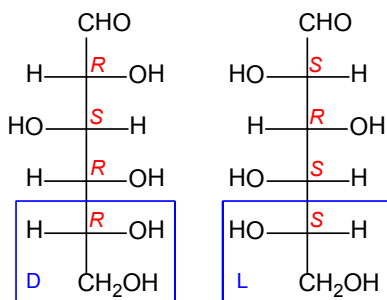
Figure 2: Two enantiomers of glucose: (+)-glucose (D-glucose, left) and (-)-glucose (L-glucose, right). Note that absolute configurations of all four centers (R/S) are different. The blue box indicates the part of the molecule which is the basis to assign it to D or L series.

There is no straight correlation between notations, for example D isomer can be either dextro - or levorotatory! In nature, sugars from D series and L amino acids occur predominantly.

Since we all are built of chiral molecules, the interaction of two enantiomers of a given compound on people, animals and plants can be different (Bentley, 2006, Smith, 2009). In particular, we can fill a different taste of the two forms. For example, LL-aspartam is sweet (and is used as an artificial sweetener) while its enantiomer, DD-aspartam, has a bitter taste (figure 3). Quite often two enantiomeric forms also smell differently (Bentley, 2006): levorotatory carvone has a spearmint scent while the second isomer smells as a caraway (other examples are shown on figure 4). More importantly, two optical isomers can differ in their biological activity, toxicity, the way they are digested and metabolized. These differences are important from the point of view of cosmetic and food industries, but, first of all, they are essential for the pharmaceutical industry (Smith, 2009). Many drugs are chiral, and very often only one of the enantiomeric forms has a therapeutic effect, with the other being inactive (like in case of DOPA, figure 5), but, much worse, it can even be toxic. Thalidomide (figure 6) was introduced to the European market half a century ago as an ideal drug for pregnant women, being used as a painkiller, a sedative, and against nausea. Later on, it was found that these women gave birth to deformed children. At that time, the drug was being marketed as an equimolar (50:50) mixture of enantiomers – called a racemic mixture – and only (+)-thalidomide has a positive therapeutic effect, while (-)-thalidomide is teratogenic. Interestingly, for several years thalidomide has been used again in the treatment of various diseases, including cancer, but patients are aware of its possible side effects (Eleutherakis-Papaiakovou *et al.*, 2004).
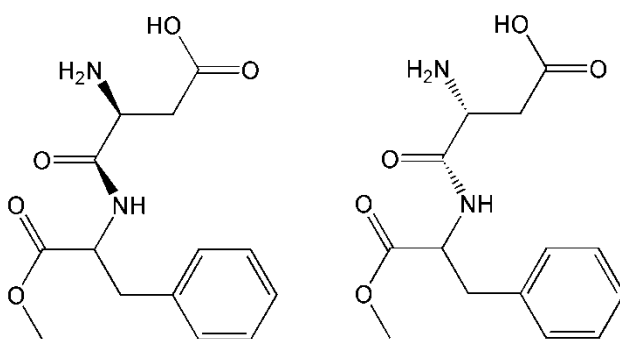
Figure 3: LL-aspartam (left) and DD-aspartam.
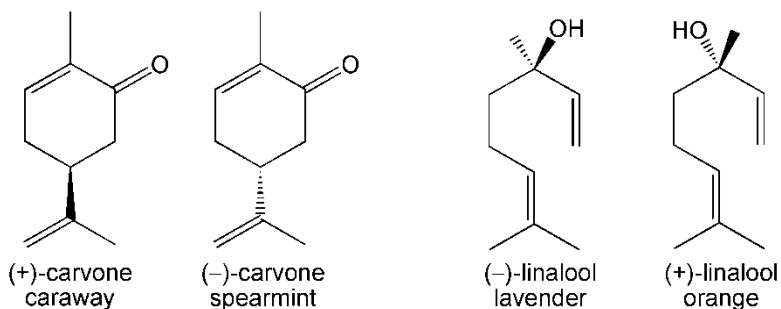
Figure 4: Examples of enantiomeric pairs with different smells.
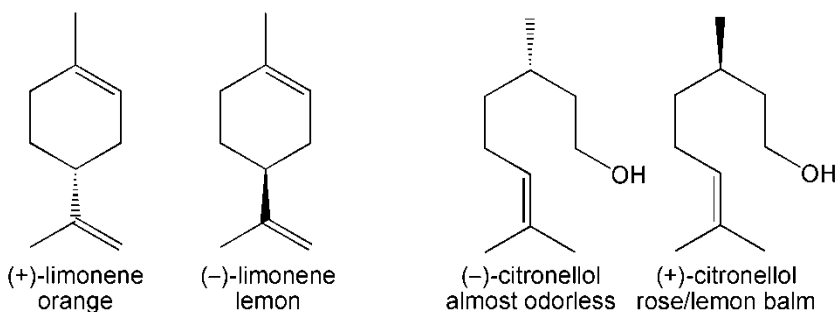
Figure 4 (continuation): Examples of enantiomeric pairs with different smells.
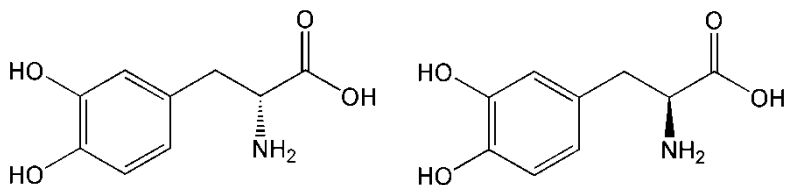
Figure 5: L-DOPA, used in treatment of Parkinson disease (left) and its inactive enantiomer.
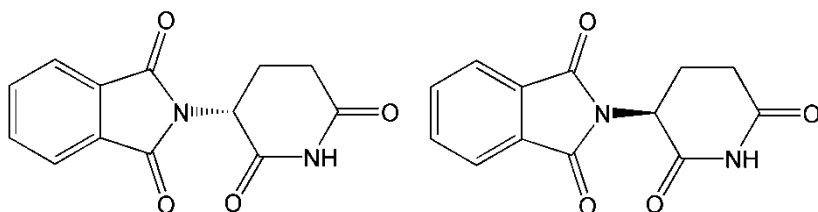
Figure 6: (+)-Thalidomide (left) and its teratogenic enantiomer.

Although for certain compounds interconversion between enantiomers occurs *in vivo* (for example, inactive *R*-ibuprofen is transformed to its active enantiomer by an isomerase present in human body; also enantiomers of thalidomide interconvert rapidly, Smith, 2009), more and more chiral drugs are sold as pure single enantiomers. This allows minimizing side effects, and determination of the therapeutic dose can be precise. Numerous examples of enantiopure pharmaceuticals include a painkiller naproxen (brand names Aleve, Accord, Nalgesin…), panthenol used for skin and hair care (*e.g.* brand name Bepanthen), antidepressant escitalopram (brand names Lexapro, Cipralex,…), simvastatin (*e. g.* brand name Zocor) used for treatment of hypercholesterolemia (figure 7).
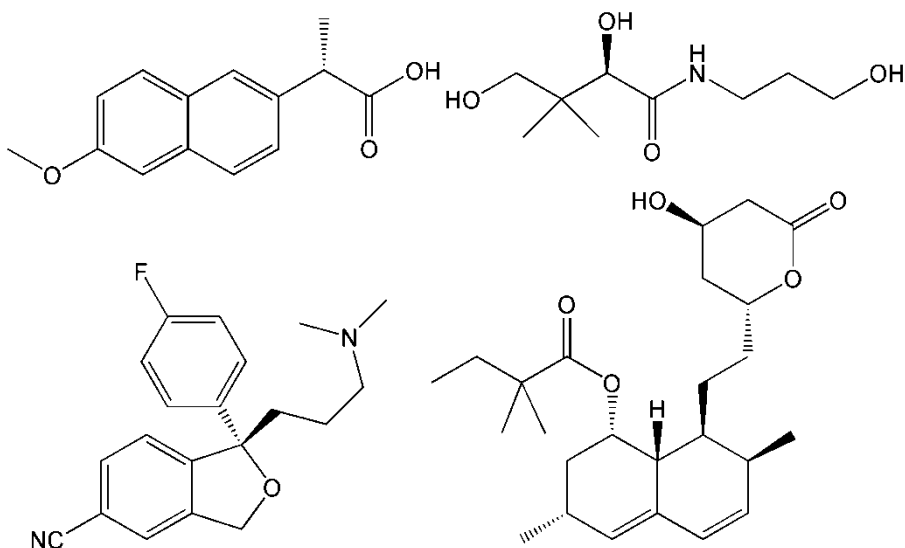
Figure 7: *Examples of chiral drugs sold as pure enantiomers. Upper row: naproxen (left), panthenol; lower row: escitalopram (left), simvastatin.*

Thus, it is important and in many cases desirable to obtain a chiral compound in one of enantiomeric forms, or at least as an enantiomerically enriched mixture. It can be achieved through separation of enantiomers or by using the so-called "asymmetric synthesis" (enantioselective synthesis) – a reaction or reaction sequence that results in selective formation of one of enantiomers (Andrushko & Andrushko, 2013). The developed synthetic procedures involve chirality transfer from reactants (substrates, available from "chiral pool"), chiral modifiers (reagents), and catalysts - metal complexes, organocatalysts, and biocatalysts (enzymes) are applied for this. Procedures leading both to high reaction yield and stereoselectivity are desired. The enantiomeric excess, a commonly used measure for the effect of asymmetric induction, is defined as:

$$\text{enantiomeric excess } (ee) = \frac{|(R) - (S)|}{(R) + (S)} \cdot 100\%$$

where (R) and (S) are the respective amounts of both isomers.

For practical reasons, the use of cheap and environmentally friendly reagents and solvents is also preferred.

Separation of enantiomers is difficult because they have identical physical properties (except for their ability to rotate plane-polarized light in opposite directions). We can use the fact that chiral molecules interact in a different manner with other chiral compounds. For example, column chromatography using chiral filling is often performed. One of the enantiomers, which has a lower affinity to the filling, is eluted first, preceding the other isomer. The process can be fully automated. Several drugs are prepared this way in an enantiomerically pure form, including escitalopram used in the treatment of depression.

Separation by crystallization can be also performed using a reversible reaction with a chiral agent. The obtained products are diastereomers (stereoisomers which are not mirror images) and due to the difference in solubility they can be separated and the starting compound recovered as a pure enantiomer. Typically, conversion to crystalline salts using chiral reagent is performed, for example, derivatives of tartaric acid and brucine are commonly used. This approach is shown for the preparation of enantiomerically pure naproxen (figure 8).
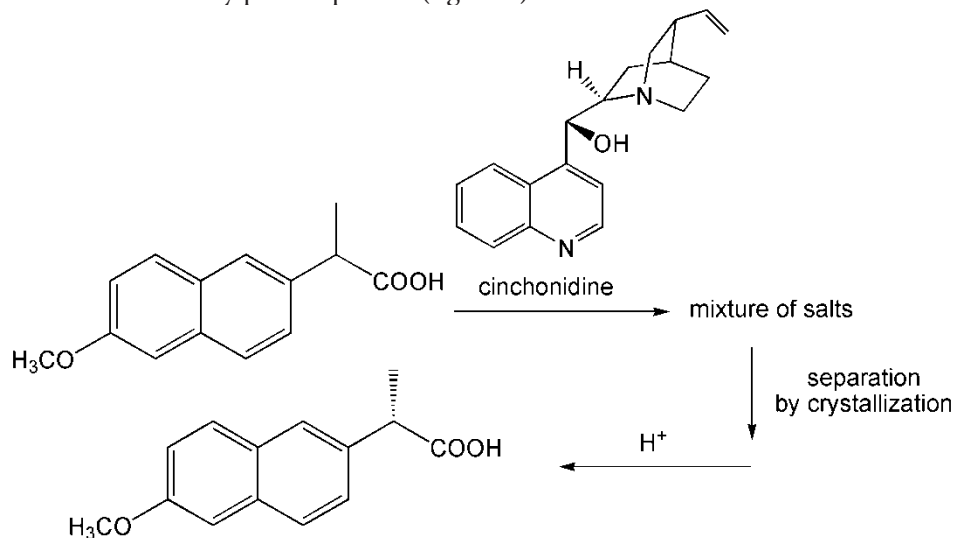
Figure 8: Separation of enantiomers of naproxen by crystallization of the respective salts (Andrushko & Andrushko, 2013).

Though chiral separations are in many cases chosen as the route for obtaining the desired isomer of a chiral compound, numerous effective enantioselective reactions

have been developed resulting in both high yields and excellent stereoselectivity. The simplest way to obtain the product as a single enantiomer is to start from chiral reactant. A great number of such compounds are available (many are isolated from natural sources), they constitute so called „chiral pool". Easily available amino acids or carbohydrates are often used. For example, the antibiotic imipenem is obtained from aspartic acid (Gawroński, 2006). An achiral compound can also be modified by using a chiral reagent – in the shown case, a reducing agent which allows obtaining one specific isomer of alcohol which is further converted to fluoxetine – antidepressant widely known under its brand name Prozac (figure 9).
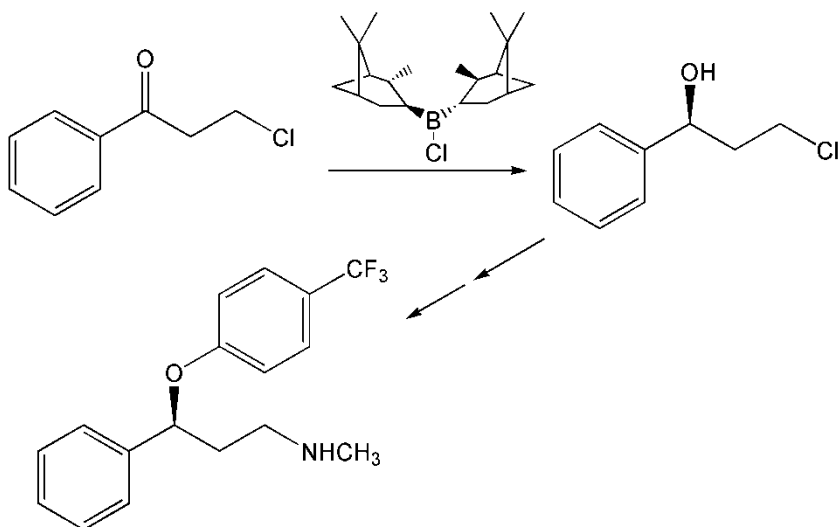
Figure 9: Synthesis of fluoxetine using a chiral reducing agent (Gawroński, 2006).

The use of chiral catalysts is a particularly attractive approach because one molecule of chiral inducer gives rise to much bigger amount of chiral product. This invention was appreciated in 2001 when William S. Knowles, Ryōji Noyori and K. Barry Sharpless were awarded a Nobel Prize for their work on enantioselective catalysis. This approach is illustrated by the application of titanium complex in the synthesis of esomeprazole (proton pump inhibitor, prevents formation of gastric acid, figure 10).
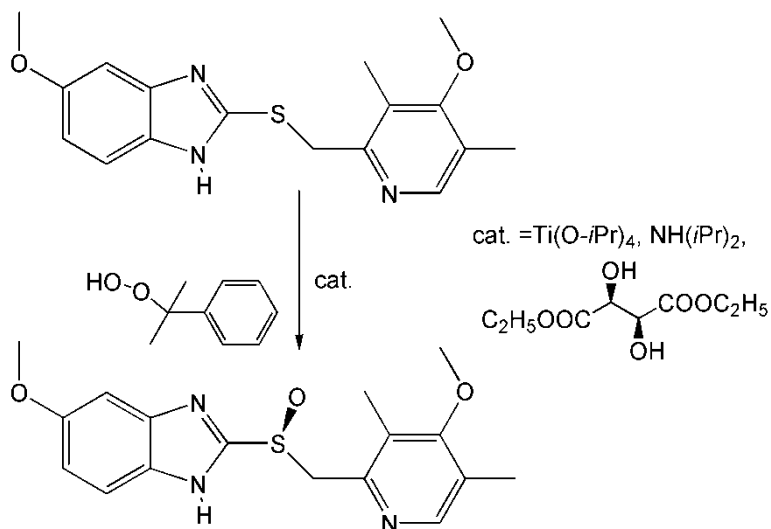
Figure 10: *Synthesis of esomeprazole (Gawroński, 2006).*

Not only metal complexes with chiral ligands are used as catalysts in the enantioselective reactions. Chiral organic molecules (organocatalysts) and biocatalysts (enzymes) are also applied, as shown in figure 11 depicting the synthesis of panthenol.
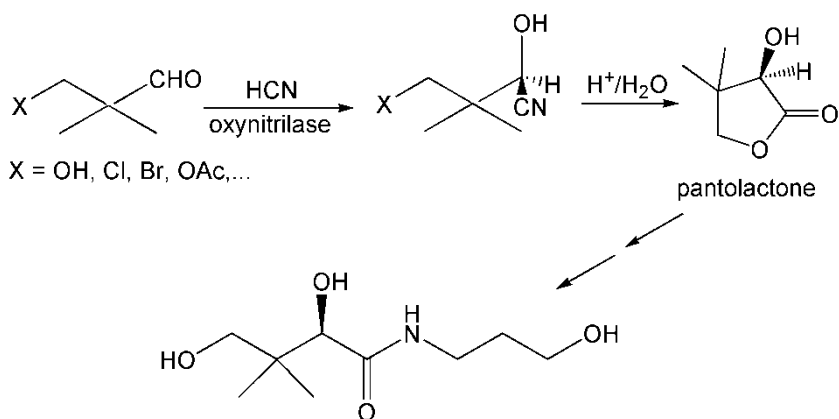
Figure 11: *Synthesis of D-panthenol (Gawroński, 2006).*

Asymmetric synthesis is used not only in pharmaceutical industry, but also in cosmetic, agrochemical and food industries. Among agrochemicals, is worth mention that several dozens of pesticides are marketed as single enantiomers (Ulrich *et al.*, 2012). Examples are shown in figure 12.
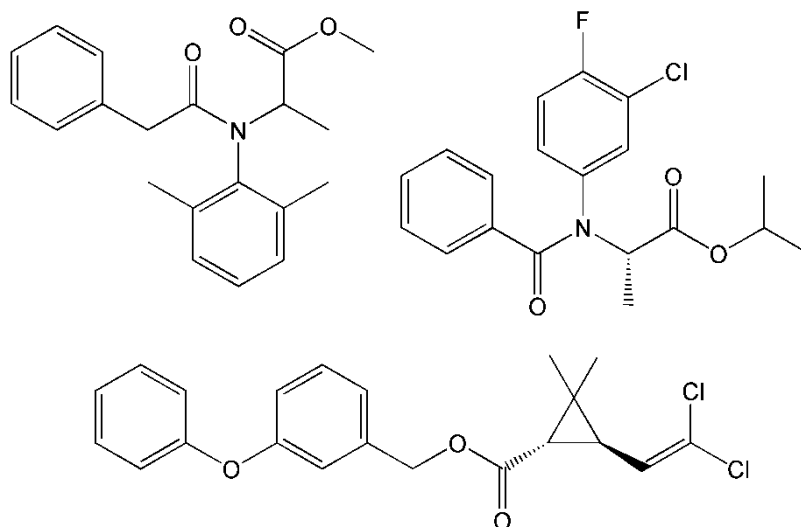
Figure 12: Examples of chiral pesticides used as pure enantiomers (Ulrich et al., 2012). Upper row: (-)-benalaxyl (a fungicide, left) and flamprop-M (a herbicide); lower row: permethrin (an insecticide).

2. Chiral sulfoxides

2.1. Preparation of chiral sulfoxides

Sulfoxides contain two carbon substituents attached to a sulfinyl group. This is a structural characteristic responsible for the reactivity of these compounds. It can be drawn in two mesomeric forms, which show that it is polar and partially double (figure 13). When two organic fragments are different, sulfur atom becomes a stereogenic center (lone pair of electrons is also treated as a substituent) and sulfoxides can be obtained in two enantiomeric forms (figure 13).
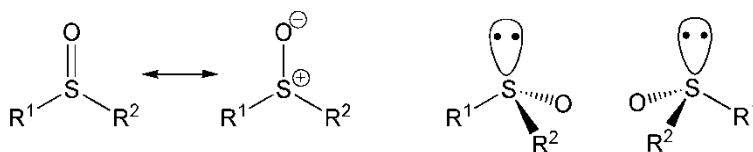
Figure 13: Two canonical structures of sulfoxides (left); two enantiomers of a chiral sulfoxide.

Chiral sulfoxides are widely used in asymmetric synthesis as chiral reactants and inducers. Their importance is connected with the fact that sulfinyl group causes high asymmetric induction, and is configurationally stable. Chiral sulfoxides have been applied in separations of chiral mixtures – examples will be described later. They are also used in enantioselective catalysis as organocatalysts or in complexes with different metals (Wojaczyńska & Wojaczyński, 2010).

Also pharmaceutical industry is interested in chiral sulfoxides since they exhibit a biological activity and can be used as drugs (figure 14). Among them, esomeprazole and its derivatives belong to the world's most sold pharmaceuticals.
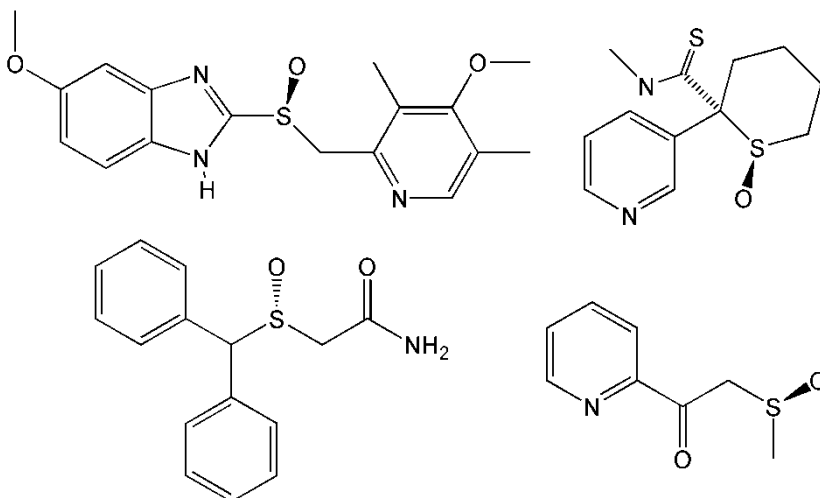
Figure 14: Examples of chiral sulfoxides used as drugs. Upper row: esomeprazole, applied to heal peptic ulcer disease (left), aprikalim – an antihypertensive drug; lower row: armodafinil – a stimulant approved for treatment of sleep disorders (left), oxisurane – an immunosuppressor.

Four principal approaches have been applied to the preparation of nonracemic sulfoxides (figure 15). Two of them require a chiral reactant – a compound with sulfinyl group or an oxidant – which are used in stoichiometric amounts. Catalytic methods make use of chiral catalysts: a metal compound or an enzyme (Wojaczyńska & Wojaczyński, 2010).
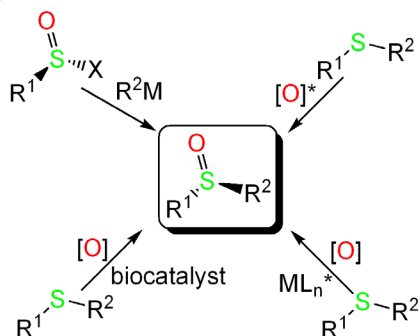
Figure 15: The four approaches to nonracemic sulfoxides (Wojaczyńska & Wojaczyński, 2010).

First enantioselective syntheses of chiral sulfoxides were based on nucleophilic substitution. The reaction of chiral sulfinyl compound with organometallic reagent

proceeds in accordance with S_N2 mechanism. Thus, a formation of a new C-S bond is accompanied with an inversion of configuration on the sulfur stereogenic center. Among different possible chiral sulfinyl transfer agents, sulfinates have been found particularly useful. While the stereoselectivity is typically high, side reactions lower the reaction yield. Precautions are also necessary typical for the reaction with organometallic compounds. Initially, the method was introduced by Andersen who proposed to use menthyl sulfinates which could be prepared in enantiomerically pure form by crystallizaton (Andersen, 1962; Andersen *et al*, 1964). The scope of the method was, however, limited since only aryl-alkyl sulfoxides and aryl-aryl sulfoxides could be prepared. Further improvements involved sulfinyl transfer reagents which could be converted, in principle, to any sulfoxide through two successive substitutions as shown in figure 16 (Capozzi *et al.*, 2001; Capozzi *et al.*, 2002).

Among other procedures, the diacetone-glucose (DAG)-based method is worth mentioning (Llera *et al.*, 1991; Fernández *et al.*, 1992). Chiral sulfinates are prepared from DAG and sulfinyl chlorides, and the configuration of the main diastereomer is dependent on a base used to the reaction. This way, both enantiomers of sulfoxide are available (figure 17). Methods based on nucleophilic substitution have been used recently for the preparation of various sulfoxides, in some cases leading to the optimal results as compared to other preparations (figure 18).
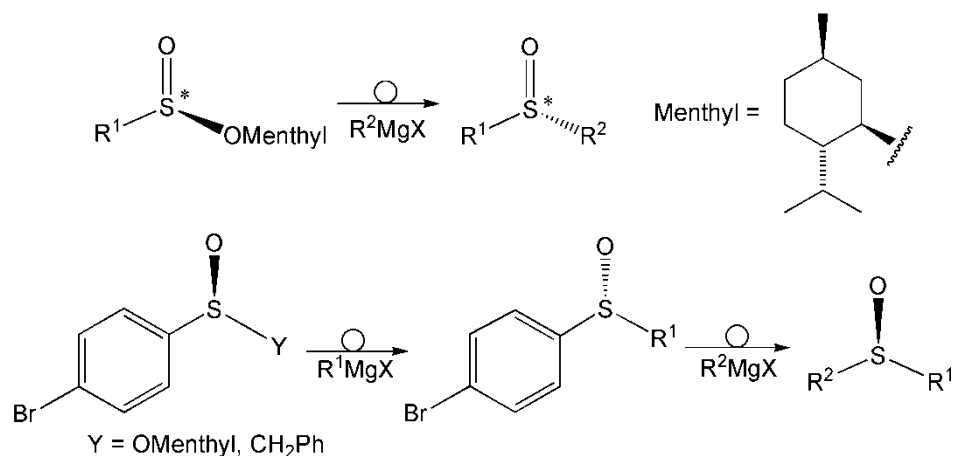
Figure 16: *The original method introduced by Andersen (1962; top) and its modification by Capozzi et al (2001, 2002).*
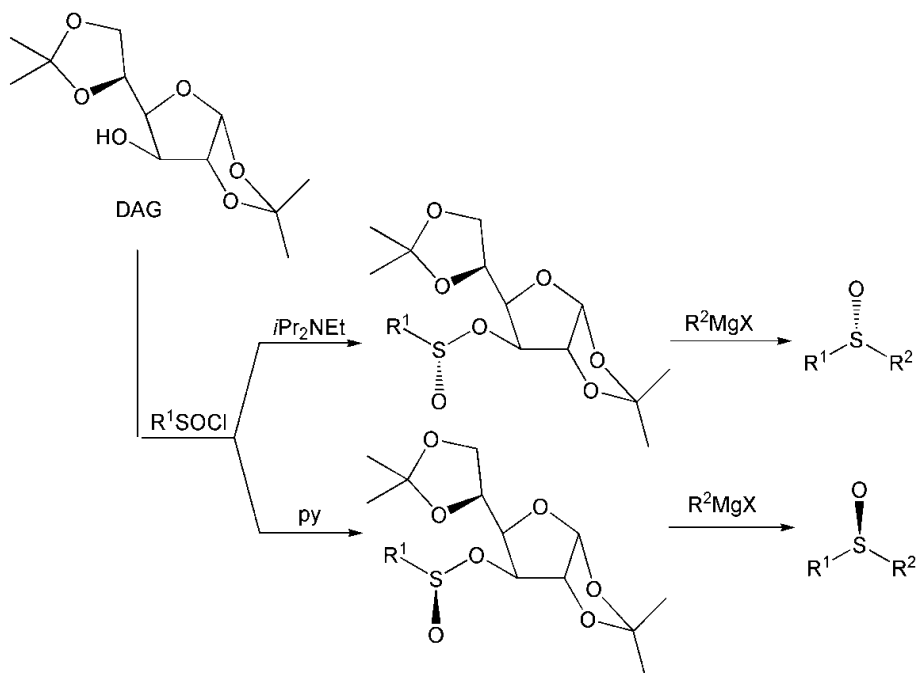
Figure 17: *Application of the DAG methodology in the synthesis of nonracemic sulfoxides (Llera et al., 1991; Fernández et al., 1992).*
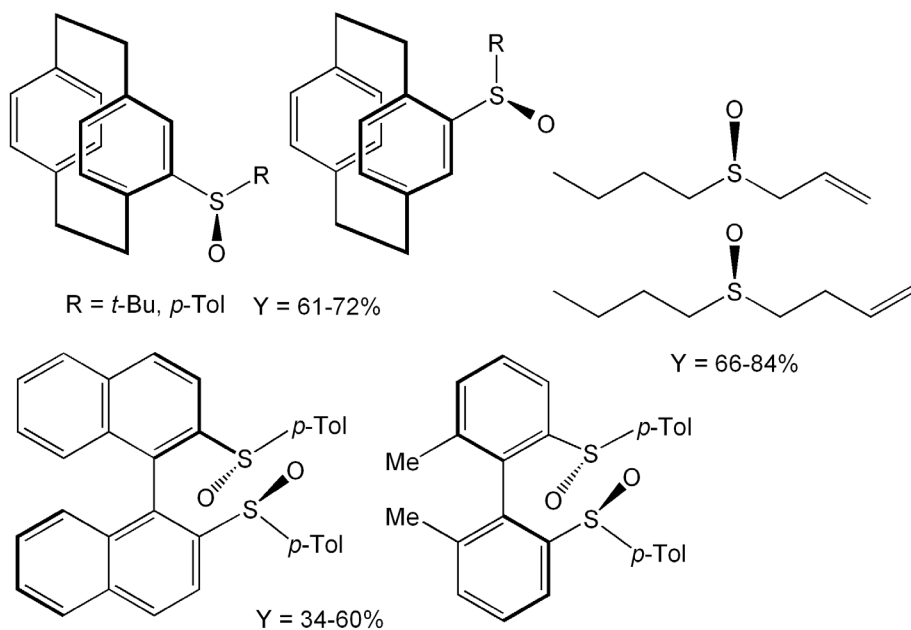

Figure 18: *Examples of chiral sulfoxides successfully prepared via nucleophilic substitution and respective yields (Y) (Hitchcock et al., 2005; Gautier et al., 1997; Mariz et al., 2008).*

However, much often various methods of the new S-O bond formation, *i.e.* oxidation of prochiral sulfides, are applied. Certain oxidants or oxidation systems are able to oxidize not only sulfide, but also a sulfoxide product. Since the interactions of a chiral oxidant with the two enantiomeric sulfoxides are different, the rate of their oxidation to sulfone may be also not identical. In many cases, the minor enantiomer reacts faster which results in enantiomeric enrichment of the remaining isomer (kinetic resolution, figure 19), but at the expense of the overall yield.
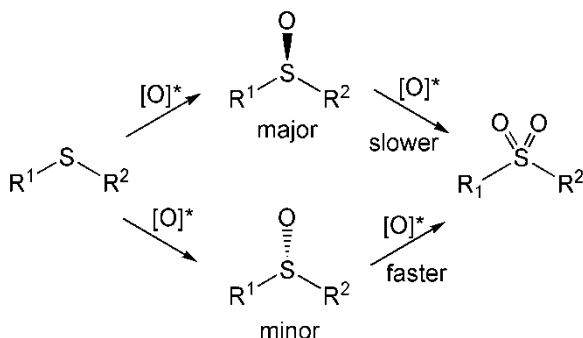
Figure 19: *Kinetic resolution of sulfoxides.*

Among chiral stoichiometric oxidants, Davis oxaziridines (figure 20) have been found especially attractive (Davis *et al.*, 1982; Davis *et al.*, 1987). The reaction yields are typically high, no sulfone is formed, and high stereoselectivities have been observed for sterically hindered sulfoxides. The main drawback of this method is connected with the high price of the oxidant, which is used in stoichiometric amounts, so in some cases it is regenerated from the chiral imine formed in the course of the reaction.
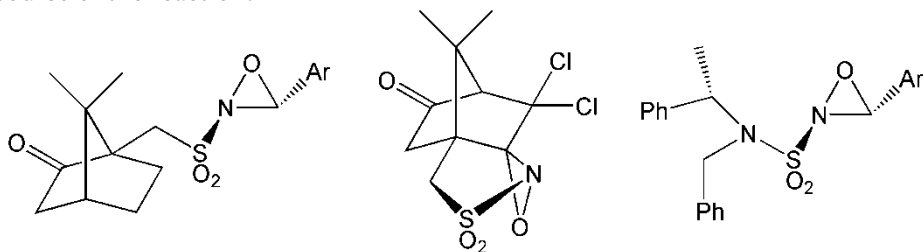
Figure 20: *Examples of chiral oxaziridines used for oxidation of prochiral sulfides (Davis et al., 1982; Davis et al., 1987).*

During the last years, new chiral oxygen transfer reagents were proposed, including oxaziridinium salt (a cholesterol derivative), a hydroperoxide, and a benziodazole oxide (figure 21). In some cases, such as oxidation of tetrathiafulvalene derivative

or benzothiepine synthesis, the use of chiral oxidants is the method of choice for the preparation of certain sulfoxides (Chas *et al.*, 2008; Wang *et al.*, 2000, figure 22).

Oxidation methods using chiral catalysts are particularly attractive, since the use of substoichiometric amount of the chiral inducer results in the effective multiplication of chirality. In most cases, the system contains chiral complex (often prepared *in situ* from a chiral ligand and a source of metal ion) and a stoichiometric oxidant. If the catalyst is available in both enantiomeric forms, typically both enantiomers of sulfoxide can be obtained. The method has also its disadvantages: the need of ligand synthesis and catalyst separation from the reaction mixture, and sometimes substrate-dependent yield and enantioselectivity of the catalytic reaction.

R = *tert*-butyldiphenylsilyl
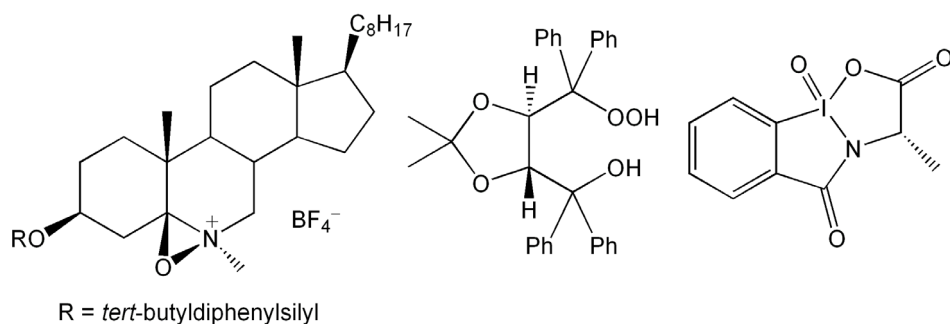
Figure 21: *Examples of stoichiometric chiral oxidants used for preparation of nonracemic sulfoxides (del Rio et al., 2007; Aoki & Seebach, 2001; Zhdankin et al., 2000).*


lansoprazole
Y = 60%, *ee* = 97%
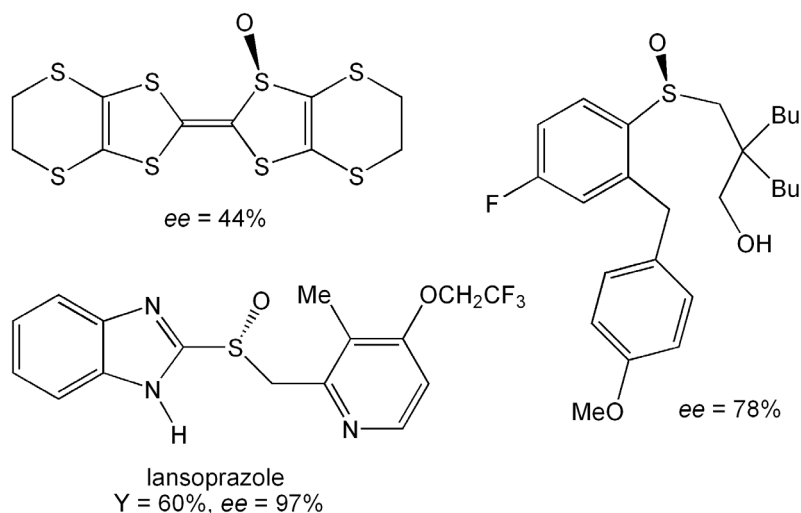
Figure 22: *Examples of nonracemic sulfoxides prepared using chiral oxidants and respective enantiomeric excess (ee) (Chas et al., 2008; Wang et al., 2000; del Rio et al., 2007).*

In 1984, groups led by Kagan and Modena independently announced the first catalytic system for the effective enantioselective sulfoxidation (Pitchen *et al.*, 1984; Di Furia *et al.*, 1984). They adapted Sharpless titanium-based catalyst using titanium isopropoxide and an enantiopure diethyl tartrate (DET, figure 23). *tert*-Butyl hydroperoxide was used as a stoichiometric oxidant. Kagan and Modena methods differed in the ratio of components, the first one also included the addition of water. Later on, various chiral diols were introduced in the place of DET by Uemura (BINOL; Komatsu *et al.*, 1992), Superchi and Rosini (1997, hydrobenzoin, HB) and other groups (figure 24). Titanium-based catalysts were widely used for the highly enantioselective synthesis of various sulfoxides, including drugs, drug precursors or drug candidates: esomeprazole, modafinil, or sulindac precursor (figure 25).
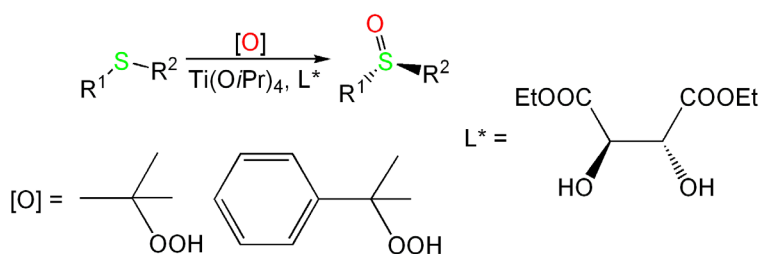
Figure 23: *Enantioselective sulfoxidation system based on titanium complexes (Pitchen et al., 1984; Di Furia et al., 1984).*
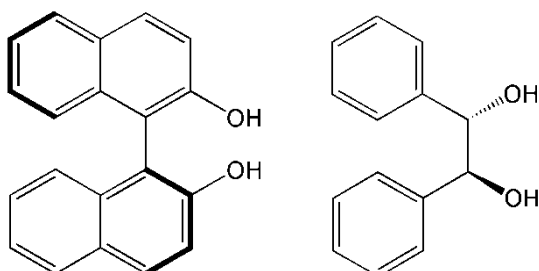

Figure 24: *Chiral ligands applied in titanium-catalyzed sulfoxidations: BINOL (left) and hydrobenzoin (Komatsu et al., 1992; Superchi & Rosini, 1997).*
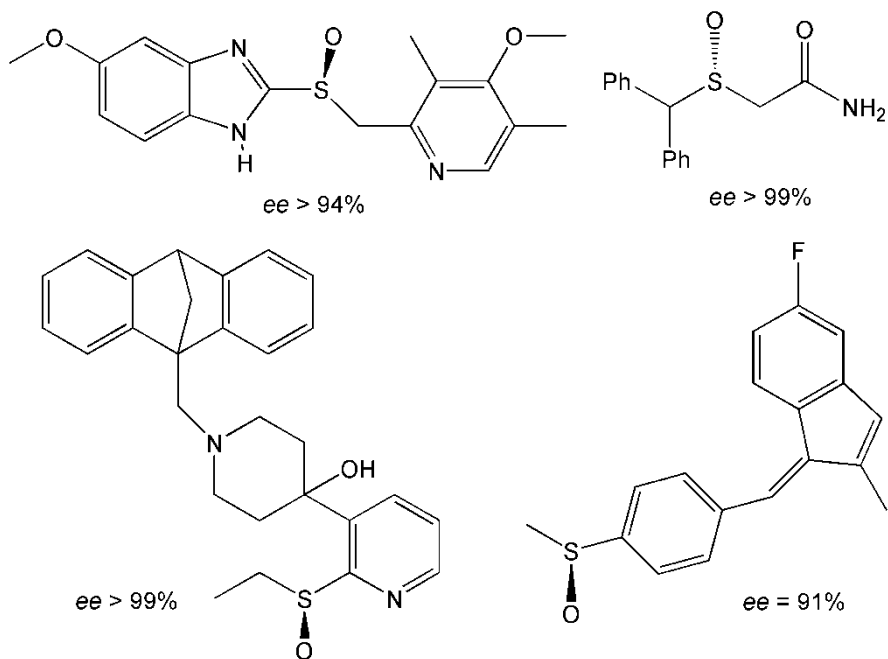
Figure 25: Examples of nonracemic sulfoxides prepared using titanium-based catalysts (Cotton et al., 2000; Rebiere et al., 2005; Maguire et al., 2001; Moseley et al., 2001).

In 1995, Bolm and Bienewald reported the efficient sulfoxidation of different sulfides by hydrogen peroxide, using catalyst formed *in situ* from vanadyl acetylacetonate and chiral tridendate Schiff base (figure 26). Mild reaction conditions, easy work-up, low catalyst loading (less than 1%) make the system attractive, though the stereoselectivities were slightly lower than for Ti-based catalysts (Bolm & Bienewald, 1995). Among other catalytic systems, several based on manganese(III) or manganese(II) complexes were tested, typically with tetradendate Schiff bases (Palucki *et al.*, 1992; Noda *et al.*, 1994). However, the results were in general worse than for titanium and vanadium catalysts. Iron-based catalysts seem more promising, also because they use cheap and environmentally friendly metal (Legros & Bolm, 2003).
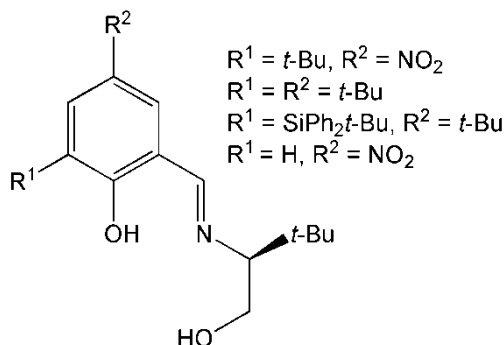
Figure 26: Chiral Schiff bases used in vanadyl-based sulfoxidation system (Bolm & Bienewald, 1995).

Sometimes sulfide is already chiral and nonracemic. In such a case, achiral oxidant can be used, but chiral oxidation system can improve the stereoselection. A diastereomeric mixture is then typically separated (Wojaczyńska & Wojaczyński, 2010). Several examples of reactants are shown in figure 27.
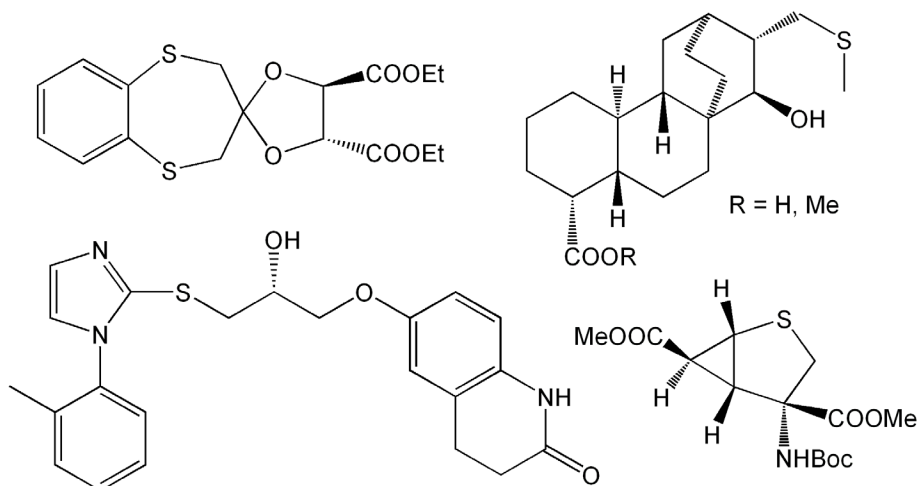
Figure 27: Chiral sulfides used in diastereoselective oxidations.

The use of biocatalysts will be preferred especially when environmental aspects are important: water is used as solvent, dioxygen or hydrogen peroxide serve as "clean" oxidants. Stereoselectivity is in most cases high due to built-in chirality of the enzyme. Biocatalysts, however, exhibit limited stability and – sometimes – high substrate selectivity (narrow operational range).

Enzymes are used either in a pure form or as whole cells of bacteria or fungi. Isolation or overexpression of enzymes a typically results in high selectivity, but in some cases lowered activity. The addition of cofactors is sometimes necessary

for the effective catalytic action. The use of whole cells allows preservation of the original activity of biocatalyst, there is no need of its isolation and cofactor addition. However, sometimes low oxidation rate is observed and sulfoxide formation can be accompanied by side reactions.

Several classes of enzymes have been applied for the enantioselective sulfoxidation, including peroxidases, monooxygenases, dioxygenases and desaturases. Peroxidases use peroxides – for example, H_2O_2 – as oxidants. These biocatalysts are able to catalyze oxidation of various sulfides with high stereoselectivity. However, their high price and limited stability constitute the main problems: enzyme (more precisely its cofactor, heme group) is destroyed by an excess of peroxide. To overcome this, the oxidant can be generated *in situ* by another enzyme.

Different methods have been developed to modify the enzyme activity, selectivity and robustness. The stability has been improved by a biocatalyst immobilization – but in most cases at the expense of activity. As certain substrates are not soluble in water, several groups tested enzymes in non-aqueous or mixed water-organic media. Also structure of both protein part (by site-directed mutagenesis) and enzyme cofactor have been modified. The latter approach, resulting in so-called artificial metalloenzymes, seems to be particularly interesting. For example, an oxidase activity can be exhibited by a normally redox-innocent proteins, serum albumins, complexed with iron(III) or manganese(III) corroles (Mahammed & Gross, 2005). Thioanisole was oxidized with hydrogen peroxide with the use of this artificial metalloenzyme with high yield and medium enantioselectivity (figure 28).
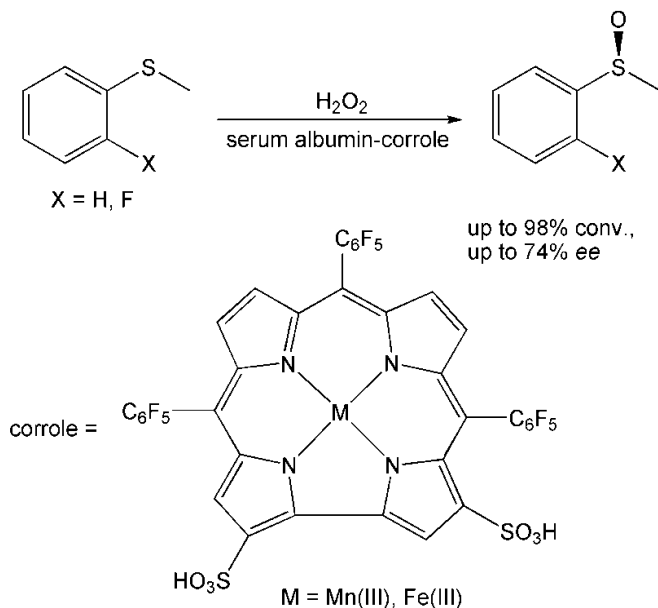

Figure 28: Sulfoxidation catalyzed by an artificial metalloenzyme (Mahammed & Gross, 2005).

2.2. Author's research

In our investigations led in Department of Organic Chemistry, we focused on the improvements of oxidation system based on vanadyl complexes with chiral Schiff bases. New ligands were prepared starting from L-valinol (easily obtained from L-valine) and derivatives of salicyl aldehyde (figure 29). Thus, significant changes were introduced to the original Bolm's system (Bolm & Bienewald, 1995; Skarżewski et al., 1999, 2001).
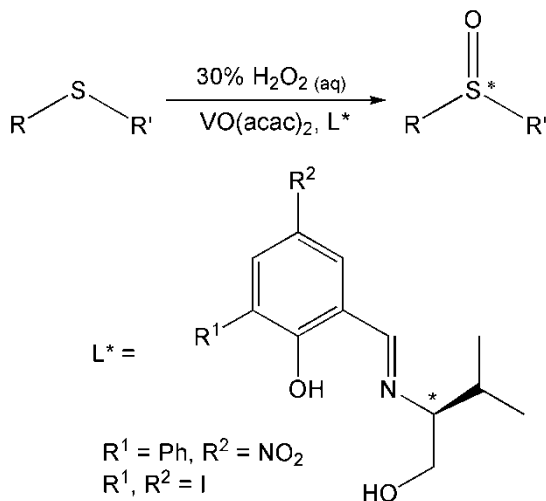
Figure 29: Chiral sulfoxidation system based on valinol derivatives (Skarżewski et al., 1999, 2001).

The catalyst was used formed *in situ* from the prepared Schiff base and vanadyl acetylacetonate. Substrates were dissolved in dichloromethane. 30% aqueous hydrogen peroxide was used as an oxidant and was added dropwise. Typically, the reaction was conducted at 273 K for 20 h. Under these conditions, thioanisole was oxidized to its S-oxide with *ee* = 75% and 90% yield – the results were better then for the original Bolm's system (Bolm & Bienewald, 1995; Skarżewski et al., 1999, 2001). While investigating the substrate scope, it was observed that the use of Schiff base with (S) configuration led mainly to (S) enantiomer of the resulting sulfoxide. Satisfactory results were obtained for the oxidation of dithiane derivatives and C_2-symmetric bissulfides (figure 30). Then we turned our attention to the transformations of homoallylic sulfoxides. Both sulfur center and double bond could be oxidized, yielding dihydroxysulfoxides bearing three stereogenic centers. It was found possible to control the stereoselectivity by the choice of the reaction sequence (figure 31), and to separate the resulting diastereomeric sulfoxides (Skarżewski et al., 2002b).

Figure 30: Sulfoxidation of dithiane derivative and C_2-symmetric bissulfide (Skarżewski et al., 1999).

As previously mentioned, a sulfinyl auxiliary can be applied in separation of racemic mixtures. The typical procedure involves introduction of sulfur atom into a substrate (in some cases it is already present). The next step requires an application of a chiral oxidation system, leading to a diastereomeric mixture of sulfoxides which is then separated. Further reactions can involve the chiral sulfinyl auxiliary, which at the end can be removed, oxidized or reduced if necessary.

Figure 31: Oxidation of homoallylic sulfoxides (Skarżewski et al., 2002b).

We tested this procedure for hydroxysulfides obtained by the reduction of a ketosulfide (figure 32). This reaction yielded a mixture of diastereomeric alcohols which was difficult to separate. To accomplish this, oxidation of sulfur was performed leading to four diastereomers (one of stereogenic centers had a fixed configuration), with a ratio dependent on oxidant used (our catalytic system yielded mainly a and d isomers), which were successfully separated (Skarżewski *et al.*, 2002a). Configuration of stereogenic centers was established through oxidation of sulfoxides to sulfones. A sulfur-containing fragment could be removed using sodium amalgam, yielding chiral alcohol with a high stereoselectivity (figure 33).

A homochiral hydroxysulfoxide (for example, the main isomer a) was used as a starting point for the synthesis of other optically pure compounds (Skarżewski *et al.*, 2003). A variety of functional groups were introduced, leading to a family of bisfunctional chiral compounds - possible ligands for asymmetric catalysis (figure 34). This was the part of our project devoted to the synthesis of bisfunctional ligands containing sulfur. We concentrated on compounds bearing a more rigid, cyclic skeleton. Starting from comercially available, enantiomerically pure diols, it was possible to prepare corresponding bissulfides *via* Hata reaction (a nucleophilic substitution; Skarżewski *et al.*, 2003; Siedlecka *et al.*, 2004). Unfortunately, for cyclohexane derivatives the stereoselectivity was rather unsatisfactory (figure 35).
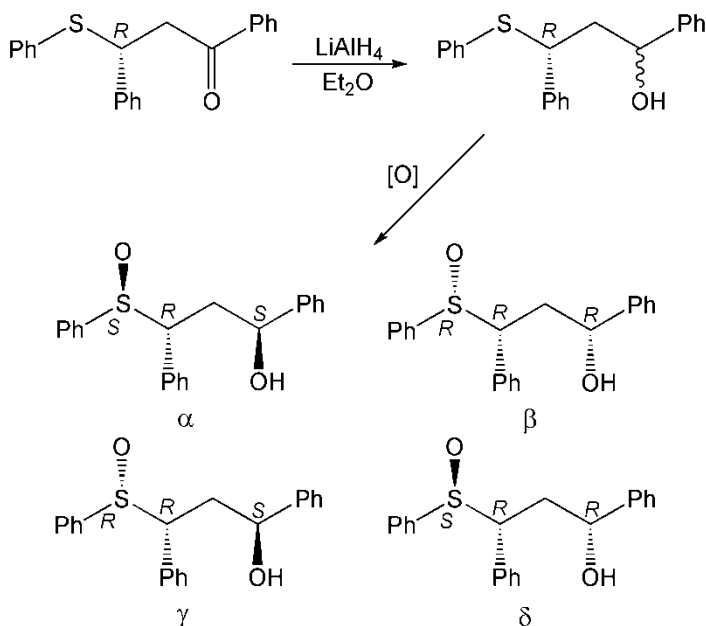

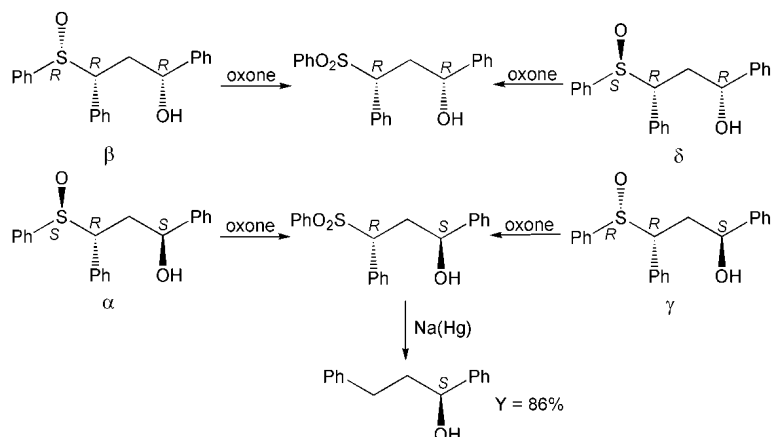*Figure 32: Oxidation of a hydroxysulfide (Skarżewski et al., 2002a).*

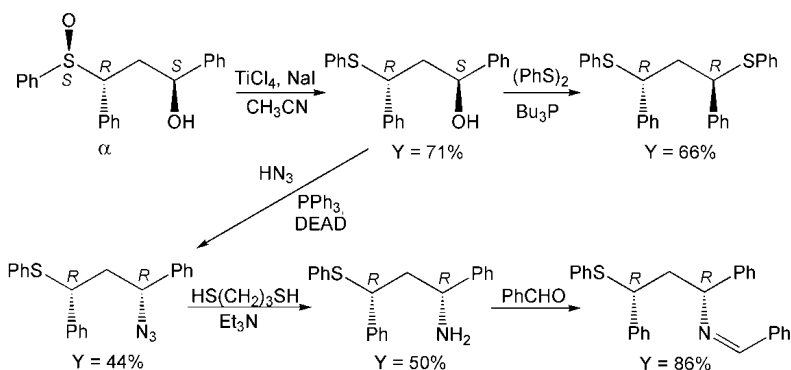*Figure 33*: *Conversions of γ-hydroxysulfoxides (Skarżewski et al., 2002a).*

Figure 34: *Synthesis of (S,X)-donating chiral ligands (X = O, S, N; Skarżewski et al., 2003).*
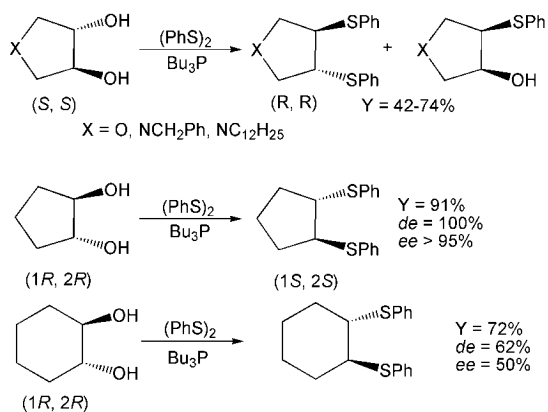

Figure 35: *Synthesis of chiral cyclic ligands containing sulfur donor (Skarżewski et al., 2003; Siedlecka et al., 2004).*

In consequence, we developed an alternative procedure: we used our catalytic system to oxidize the bissulfide (figure 36). The reaction led to a mixture of mono- and bissulfoxides (the ratio dependent on stoichiometry) which were separated. The main isomeric bissulfoxide could be additionally enantiomerically enriched by recrystallization. Its reduction led to enantiomerically pure (*1R,2R*)-1,2-bisphenyl-sulfanylcyclohexane (Wojaczyńska & Skarżewski, 2009). Circular dichroism (CD) spectra allowed establishing the configuration of sulfur center which appeared consistent with chiral Schiff base preference.
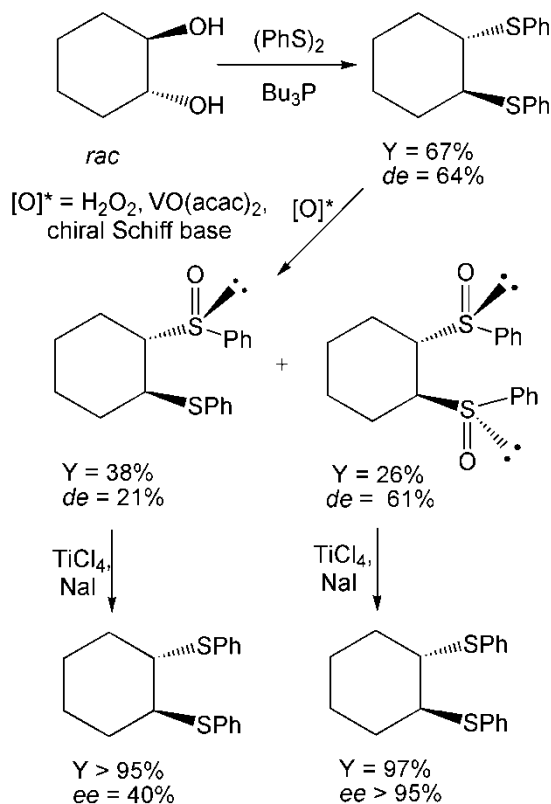
Figure 36: *Synthesis of enantiopure (1R,2R)-1,2-bisphenylsulfanylcyclohexane (Wojaczyńska & Skarżewski, 2009).*

Interestingly, when only one of hydroxyl groups in starting diol was substituted, the stereoselectivity was high. The two-step procedure was then applied to the synthesis of various cyclohexane-based chiral ligands containing sulfur or sele-nium donor in enantiomerically pure form (Wojaczyńska & Skarżewski, 2008). We tested our chiral five- and six-membered ring derivatives in a palladium-catalyzed

Trost-Tsuji reaction (figure 37). In several cases the stereoselectivity was high, with *ee* up to 90%.
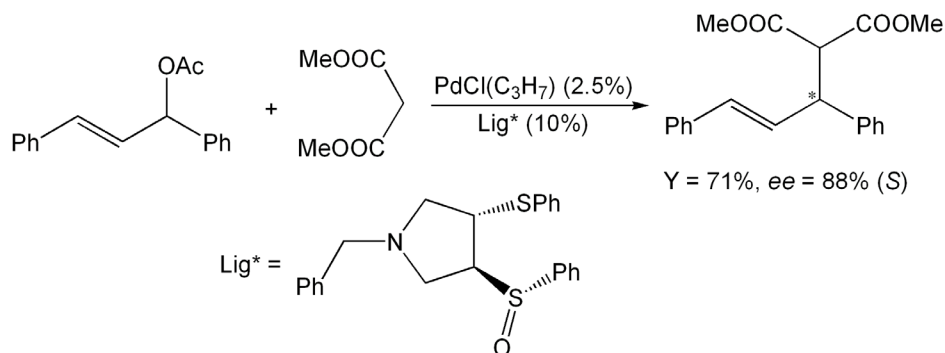
Figure 37: *Palladium-catalyzed Trost-Tsuji reaction with a chiral sulfoxide-sulfide derivative based on a pyrrolidine skeleton (Siedlecka et al., 2004).*

2.3. Summary

Part 2.2 gives a short overview of the Author's work on the development of synthetic methods for the preparation of chiral sulfoxides and their application in asymmetric synthesis. The results were described in nine original papers (Siedlecka *et al.*, 2004; Skarżewski *et al.*, 1999, 2001, 2002a, 2002b, 2003; Wojaczyńska & Skarżewski, 2008, 2009; Wojaczyńska *et al.*, 2010). The advances in the field were reviewed in a 2010 article which was published in Chemical Reviews (Wojaczyńska & Wojaczyński, 2010). Since its publication, the review was cited over 100 times which proves the vitality and relevance of the topic.

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Teaching Crossroads