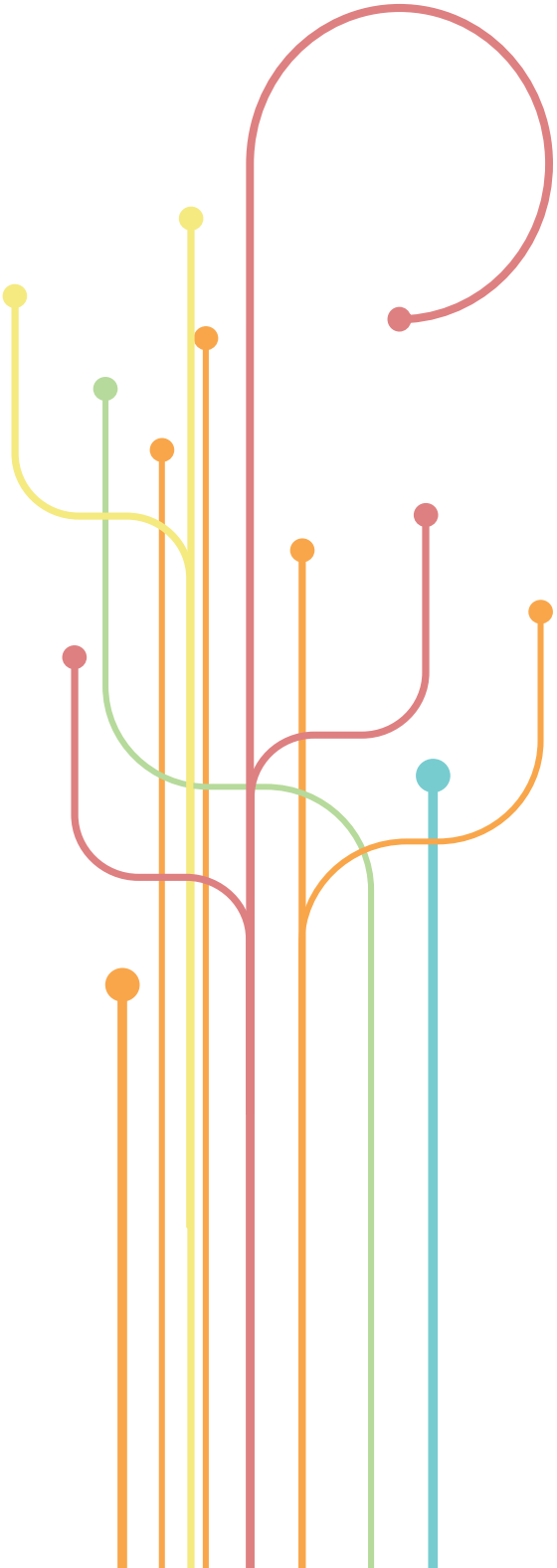

Teaching Crossroads

Edited by

Elisabete Silva
Clarisse Pais
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ipb INSTITUTO POLITÉCNICO DE BRAGANÇA

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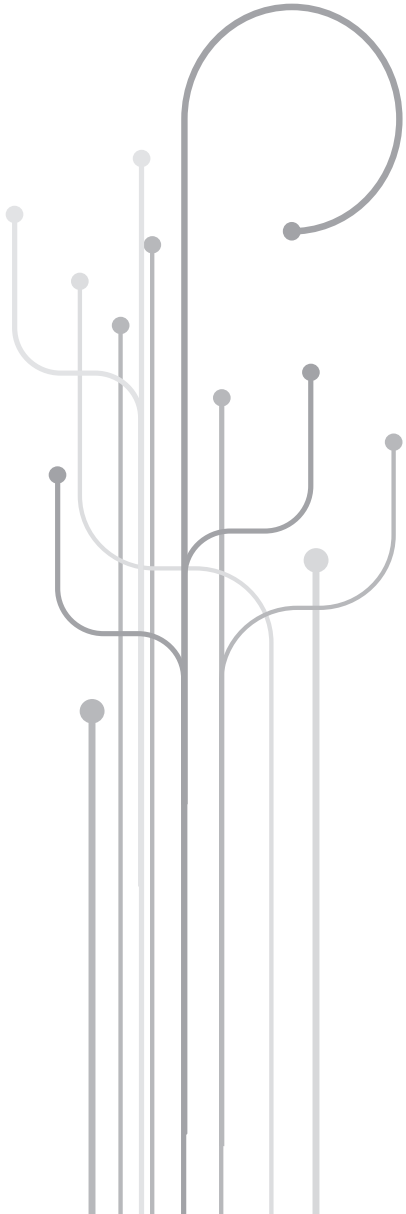

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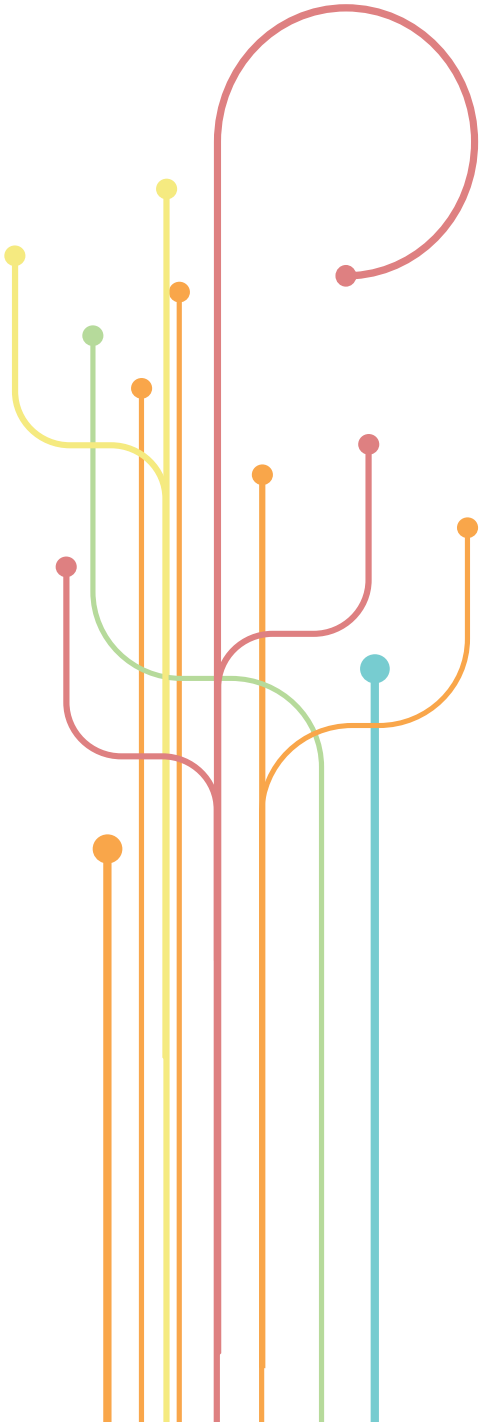

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Preface

Elisabete Silva; Luís S. Pais; Clarisse Pais

The Editors

We are proud to present the second number of *Teaching Crossroads*, within the 8th IPB Erasmus week which took place in May 2012. This publication is the result of the papers delivered during our Erasmus Week that is becoming increasingly popular among teaching and non-teaching staff from several Erasmus partner Universities. Similarly to last year, we are continuing the publication of *Teaching Crossroads* whose main purpose is to reach students and teaching staff of the IPB (Polytechnic Institute of Bragança) and of other IPB partner universities. With this in view, the authors also made an attempt to present material in a manner which can be readily grasped by students and non-specialists. Likewise, we also believe it is important to have a written register of what is being studied by some researchers in Europe and make it available to students.

Bearing in mind the open spirit of this publication, everyone is invited to participate with their papers delivered during the Erasmus Week at the IPB. The result was pleasantly rewarding as we had enthusiastic participants who very willingly made their texts available for publication.

The organisation of the Erasmus week has been a tradition since started in 2005 aiming at a more efficient collaboration with our European partners so that they would become more familiar with the IPB campus, its schools, the city and the region. During the IPB Erasmus Week, the Institute organises teaching and staff training (STT) and seminars arranged under Staff Teaching Assignment (STA) that are scheduled and introduced in the regular timetable of Bachelors and Masters' degrees classes.

Having now participated in the Erasmus mobility programme for more than twelve years, the IPB is acknowledged as one of the Portuguese institutions that promotes students and teaching mobility the most, positioning IPB on the top of the European HEIs and on a high level in the current international scene.

The review of these articles has been thorough, yet some unexpected flaws may still occur. Nevertheless, the content of the texts remains intact, without distorting the aims of the texts, and the references are the authors' own responsibility. Therefore, we accept no liabilities for any error or theoretical inconsistency or any missing information.

The research areas are quite multidisciplinary, touching on areas as different as business sciences and law, agricultural sciences and natural resources, chemistry, multimedia and education. These areas comply with the areas of study that the IPB has on offer. This publication is hence rather beneficial for our students, as well as teachers and researchers.

Ziemowit Kukulski, with his customary precision, expands on a topic that is truly current and relevant nowadays: 'The elimination of double taxation in juridical sense from Polish perspective'. Notwithstanding the fact that the study focused on a particular country, the author is also concerned with comparing both the Polish and the Portuguese juridical taxation framework.

Rosa Vásquez presents a study on how the environment plays an important role in the economy and can contribute to making the business sector more dynamic. Emphasising the importance of state policies that affect the environment, her text outlines the different instruments available to public administration in order to enable environmental control of productive activities and promote good conduct in favour of environmental conservation.

Bodgan Vlad Avarvarei presents the results of an analysis of commodity for some yoghurt assortments sold on Iasi market, in Romania. The author also aims to inform the consumers regarding not only all the information which must be marked on, such as fat content, nutritive value, shelf life, storage temperature, etc., but also to give some hints on the product design.

Mario de la Fuente Lloreda gives a lesson on different ways of Spanish viticulture, exposing examples of one of the most emblematic D.O. (denominación de origen, i.e. protected designation of origin) quality brands and their evolution up to today.

Igor Barényi's text delves into spectral analysis, focusing on the description of several spectroscopic methods to examine chemical composition of metal and alloys.

Esteban Galán-Cubillo takes us on a tour to the use of systems of virtual scenography, along with the use of other digital technologies.

Cláudia Martins's text gives us a very insightful glimpse on Portuguese meteorological adages and proverbs bearing the highly suggestive title 'Nine months of winter, three months of scorching hell'. Besides that, the author also presents a thorough linguistic explanation on fixed language, ranging from collocations to idiomatic expressions, based on several keynote authors, with a particular focus on pragmatic phrases, i.e. proverbs and adages.

Jan Michalko makes an introduction to Cyber Space Economics and its relevance for such an important area as education or even training of citizens as it is in the case of public services for increasing levels of e-government. The author also emphasises the importance of Internet applications that provide a number of opportunities for education, communication and business.

Slawomir Sztajer presents a deep reflection on religion, establishing a link between cognition and religion. The author expands on this new approach of religion, explaining and interpreting religious phenomena from the perspective of cognitive science.

The ingredients for a gainful and stimulating reading are now served. We hope that this publication works for the interest of many students and teachers who find here information for their own studies and learn a bit more about the countries referred to here, sharing learning experiences and scientific knowledge, as well as cultural heritage. That is also the essence of the Erasmus programme.

Business Sciences and Law

The Elimination of Double Taxation in Juridical Sense from Polish Perspective

Dr Ziemowit Kukulski

University of Lodz
Poland

I. Introduction

Double taxation, both in juridical and economic sense causes serious obstacles in the modern cross-border economic relations. It is one of the reason why foreign investors may refrain from direct investments in one tax jurisdiction but also influences the strategic economic decision of domestic investors where to locate their businesses: in a home country or abroad.[1] The reason is very simple: nobody wants to pay twice, especially taxes and other public duties. Juridical double taxation arises directly from the fiscal sovereignty of states and is strictly connected with the residence and source principles on the basis of which courtiers all over the world levy the tax liability on taxpayers but also with the connecting factors used by countries in order to establish the link between taxpayers and tax jurisdiction (the criteria of tax

1) S. James, Ch. Nobes (2006/2007: 19-21), *The Economics of Taxation. Principles, Policy and Practice, Seventh Edition, Updated,* Pearson Education Limited, Edinburgh, pp. 291-295 and I. Loncarevic,(2005) *Economic Relevance of Double Taxation Conventions,* [in:] , *Tax treaty policy and development*, Wien: Linde Verlag, pp. 19-21.
(ed.) H. Litwińczuk (2009: 311-312). Podatki bezpośrednie. Prawo polskie a prawo wspólnotowe. Implementacja dyrektyw – orzecznictwo ETS, (ed.) H. Litwińczuk (2009), Warszawa: Biblioteka Prawa Podatkowego, pp. 311-312.

residence).[2] The collision between these two principles and collision between factors used by countries as the criteria of taxpayers' residence results in double taxation in juridical sense: unlimited tax liability of resident taxpayers receiving income or possessing property located abroad versus limited tax liability of non-resident taxpayers receiving income or possessing property located in a foreign country (the source taxation). Double taxation in juridical sense is mostly an international issue, it means that the same person, the same income or property is taxed twice for the same taxable period in two different tax jurisdictions (countries) – where one of these countries is a country of taxpayer's residence, the other is the country of source of the income (or property). Contrary economic double taxation is both international and domestic issue. Economic double taxation may occur where the same income, but in the hand of two different taxpayers is taxed twice. The finest example of economic double taxation is the taxation of dividends and other income from shares in a, company's profits, which are taxed first at the company level and then as dividend distributed to company's shareholders – is taxed again.

The main purpose of this article is to show how the problem of juridical double taxation is eliminated and what the Polish practice in this field is. I will also examine the two main internationally accepted and applicable methods designed for the elimination of juridical double taxation: the exemption method and the tax credit method.

II. Legal Measures Against Double Taxation in Juridical Sense

The international double taxation in juridical sense can be mitigated by **unilateral measures, bilateral measures,** and finally by **multilateral measures**. Unilateral measures eliminating double taxation in juridical sense are historically the oldest and still they play a very important role because not all cross-border relations are covered by the subjective and objective scope of application of double taxation conventions.[3]

Historically the **unilateral measures designed for avoidance of double taxation** in juridical sense are the oldest. Unilateral measures eliminating double taxation are contained in the domestic tax law provisions of every country, so their nature is rather heterogeneous but also endemic. From the legal perspective they could take the form of **special tax reliefs (i.e. tax exemptions)** applicable for example to a certain group of non-resident taxpayers or even to resident taxpayers obtaining specific types of income form sources located in one country. By virtue of these unilateral measures, countries may refrain themselves from taxation in relation to certain groups of taxpayers or in relation to specific types of income or property. Such tax exemptions are often encountered in relation to members of diplomatic missions and consular posts. Moreover, unilateral measures for the avoidance of

2) See: M. Lang (2010, pp. 23-26))

3) See: M. Zasiewska, A. Oktawiec, J. Chorazka (2011, pp. 462-480).

double taxation in the juridical sense can take the form of deductions (deductions) of the tax paid by a resident taxpayer in a foreign country (the source country) from the tax computed on taxpayer's total income (income form domestic and foreign sources) in the country of taxpayer's residence. This form of unilateral measure against double taxation in juridical sense is commonly known as **unilateral tax credit** and it will be discussed in detail in the IVth part of this article.

The main disadvantage of unilateral measures against juridical double taxation is their heterogeneous nature. Their application depends usually on respect for the principle of reciprocity in the mutual relations between two countries involved. In other words it is connected with same-like relief granted by the other country. Taking the reciprocity principle into account it should be noted that unilateral measures against juridical double taxation have rather limited scope of application, but it does not mean that they are ineffective. Additionally in some countries, i.e. Poland, they are available only for resident taxpayers receiving their income or having their property abroad if there is no double taxation convention in force concluded with the source state. In that case, unilateral measures against double taxation in juridical sense are the only available mechanism to prevent/mitigate this phenomenon. An example of such a unilateral measure for the elimination of double taxation in the juridical sense is the unilateral credit method provided in art. 27 sec. 9a of the Personal Income Tax Act in Poland, according to which an individual resident of Poland receiving foreign-sourced income from countries with which Poland has not concluded the double taxation convention are allowed on the basis of this provision to deduct the tax paid in the source country on the income generated in the foreign tax jurisdiction.

Bilateral measures are practically the most effective measure against double taxation in juridical sense. These measures take the legal form of **bilateral double taxation conventions (tax treaties)** concluded between two contracting states. Their aim is in the first place the elimination of double taxation in the juridical sense but also contain some legal provisions protecting fiscal interests of two contracting states against tax evasion (i.e. provisions governing the exchange of tax information between competent tax authorities of both contracting states, the assistance in collection of taxes and the mutual agreement procedure). Bilateral double taxation conventions are nowadays the most widespread in the world and the most effective means eliminating double taxation in juridical sense. Taking into consideration the objects (i.e. taxes covered by provisions of such treaties) there could be distinguished two basic types of such treaties: 1) double taxation conventions on income and

capital taxes[4] and 2) double taxation conventions on inheritance and gift taxes. In practice double taxation conventions on income and capital taxes are the most popular among countries. This type of tax treaty is applicable to taxes on income and on capital imposed on total income or total capital, or on elements on income or elements of capital, including taxes on gains from the alienation of movable property or immovable property, taxes on the total amounts of wages or salaries payed by enterprises, as well as taxes on capital appreciation. For example, Poland is now a party of more than 90 bilateral tax treaties concerning the avoidance of double taxation in juridical sense with respect to income and capital taxes. Poland has concluded bilateral tax treaties of this type with all Members States of the EU and the EEA except the Principality of Liechtenstein. Unique in this context it is still valid a bilateral tax treaty with non-existing state of Yugoslavia, which is currently in force between Poland and Bosnia and Herzegovina, Serbia and Montenegro.

Furthermore, according to the announcement of the Polish Ministry of Finance from 4th June 2005 (published in Monitor Polski 2005 No. 40, item. 543 dated 13.07.2005) on the list of dependent or associated territories of the United Kingdom of Great Britain and Northern Ireland and the Kingdom of the Netherlands, Poland signed the agreement for elimination of double taxation the taxation of income from savings of individuals with the following dependent territories or associated territories of the United Kingdom of Great Britain and Northern Ireland and the Kingdom of the Netherlands:

1) The Netherlands Antilles,
2) Jersey,
3) Guernsey,
4) Isle of Man,
5) British Virgin Islands,
6) Turks and Caicos Islands.

4) The finest example of the taxes covered by the scope of applicaton of double taxation convention on income and capital is Article 2 of the treaty concluded between Poland and Portugal on 9th May 1995 in Lisbon (published in Poland in Official Journal from 1995, No 48, Sec. 304), according to which the convention shall apply to taxes on income and capital imposed on behalf of a Contracting State or of its political subdivision or local authorities, irrespective of the manner in which they are levied (art. 2 sec. 1). The existing taxes to which the convention shall apply are in particular: in Poland a) personal income tax (podatek dochdoowy od osób fizycznych) and b) corporate income tax (podatek dochodowy od osób prawnych) called Polish taxes and in Portugal: a) personal income tax (Imposto sobre o Rendimento das Pessoas Singulares-IRS); b) corporate income tax (Imposto sobre o Rendimento das Pessoas colectivas-IRC); c) local corporate income tax (Derrama); called Portuguese taxes (art. 2 sec. 3). Moreover, the convention shall apply also to any identical or substantially similar taxes that are imposed after the date of signature of the convention in addition to, or in place of, the existing taxes. (Art. 2 sec. 4). The competent tax authorities of the Contracting States shall notify each other of any significant changes that have been made in their taxation laws.

Although inheritance and gift taxes are property taxes they are usually not covered by the scope of application of double taxation conventions on income and capital taxes. Practically there is a practice of concluding the separate double taxation conventions covering this type of taxes. But contrary bilateral tax treaties on inheritance and gift taxes are rarely concluded. Poland is still nowadays a party of three such bilateral treaties, they were concluded before the Second World War with Austria, Czechoslovakia (now in force with the Czech Republic only, not with Slovakia) and Hungary. There is no practice of concluding inheritance and gifts double taxation conventions despite the fact that the problem of double taxation in case of inheritance and gifts taxes is also very relevant.

Finally, **multilateral measures against double taxation** in juridical sense take the legal form of **multilateral tax treaties**. Multilateral tax treaties are very rare. Examples of these treaties in force are: the Nordic Treaty of 1962 concluded between Denmark, Finland, Iceland, Norway and Sweden, and the Andean Treaty of 1969 concluded between: Bolivia, Chile, Ecuador, Colombia, Peru and Venezuela. At the moment Poland is not a party to any multilateral treaty for avoidance of double taxation in the juridical sense. In the past, Poland was a party to two such treaties with the Member States of the Council for Mutual Economic Assistance (CMEA) – so called COMECON Tax Treaties – these treaties were: Agreement for the avoidance of double taxation of income and capital corporation, signed in Ulaanbaatar (Mongolia) on 19 May 1978 and the Agreement for the avoidance of double taxation of income and property of individuals, signed in Miskolc (Hungary) on 27 May 1977. Both treaties terminated in 1991. Poland has concluded new bilateral double taxation conventions with most signatory states (i.e. except Cuba) and their successors (i.e. Ukraine, Belarus, Georgia, Armenia, Azerbaijan, Kazakhstan and the other ex-Soviet Republics) based on the OECD Model Tax Convention on Income and Capital.

It is worth noting that Poland is a party to a multilateral international agreement - the Convention of 23 July 1990 on the elimination of double taxation in connection with the adjustment of profits of associated enterprises, better known as the Arbitration Convention (in force since 2007). Parties of the Arbitration Convention are the Member States of the European Union. However, it should be noted that the Arbitration Convention contains rules designed for elimination of double taxation in the economic sense of profits of associated enterprises but not the double taxation of these profits in juridical sense.[5]

III. Bilateral Agreements for Elimination of Double Taxation in Juridical Sense – Polish Treaty Practice

Many of bilateral double taxation conventions concluded by Poland are based on the OECD Model Tax Convention on Income and Capital, an international

5) H. Hamaekers, K. Holmes, J. Głuchowski, T. Kardach, W. Nykiel, (2006, pp. 184-187).

accepted model tax treaty developed by this organization.[6] So in general they follow the structure of the OECD Model. A typical double taxation convention concluded by Poland contains the preamble to the convention and 7 following chapters: chapter I regulates the personal and objective scope of the convention, chapter II contains general definitions of terms used in the whole text of the treaty (i.e. definitions of the term "person", "company", "enterprise", "resident" and "permanent establishment"), chapter III contains the allocation rules in respect to specific types of income: art. 6 – income from immovable property, art. 7 – business profits, art. 8- shipping, inland waterways transport and air transport, art. 9 – associated enterprises, art. 10 – dividends, art. 11 – interest, art. 12 – royalties, art. 13 – capital gains, art. 14 – independent personal services (art. 14 was deleted from the OECD Model in 2000, but it still exists in many double taxation conventions), art. 15 – income from employment, art. 16 – directors' fees, art. 17 – artists and sportsmen, art. 18 – pensions, art. 19 – government services, art. 20 – students, art. 21 – other income. Chapter IV of the typical tax treaty concluded by Poland contains only one provision in art. 22 – taxation of capital. Chapter V regulates two methods for elimination of double taxation in juridical sense: the exemption method (art. 23A) and the credit method (art. 23B). Chapter VI contains special provisions of non-discrimination in tax matters (art. 24), mutual agreement procedure (art. 25), exchange of tax information (art. 26), the assistance in collection of taxes (art. 27) and finally general rule governing the tax situation of members of diplomatic missions and consular posts. The last provision of chapter VI is devoted to the territorial extension of the application of the treaty (art. 29). Chapter VII of the treaty regulates final provisions: entry into force of the treaty (art. 30) and termination of the treaty (art. 32).

Although tax treaties follow the OECD Model Tax Convention each individual tax treaty is negotiated separately. So both contracting states are free to introduce different provisions than the ones proposed by the OECD Model Tax Convention. That's why in some double taxation conventions concluded by Poland the allocation rules based on the other model tax treaty – the UN Model – can be also found. The finest example of the deviation from the OECD Model is art. 12 of tax treaties concluded by Poland. In many cases contrary to the OECD Model it gives the right to tax royalty payments not only to the country of residence of the recipient (as it is in case of the OECD Model) but also to the country of source of these payments. This difference from the OECD Model is practised mostly by developed countries in the world in order to protect their taxing rights as the country of source of this specific type of income.

The main purpose of the tax treaty is the allocation of taxing rights between two contraction states in respect to different types of income and capital. These rules

6) See: M. Lang, *op. cit*., pp. 27-29; and The OECD Model Tax Convention on Income and on Capital. Condensed version 2005 and Key Tax Features of Member Countries, (2005) Amsterdam: pp. 7- 18.

are contained in chapter III and IV of the treaty: taxation of income and taxation of capital. It is worth to emphasize that the tax treaty itself does not create any new tax liability or does not introduce any new tax which should be paid either to residence or source country. The tax treaty only allocates the right to tax between both contraction states. In other words, by concluding a double taxation convention, both contracting states commit themselves to relinquishing or restricting their taxing rights in respect to income and capital to which the tax treaty signed by them shall apply.[7]

According to Polish constitutional legal order, the imposition of taxes, as well as other public imposts, the specification of those subject to the tax and the rates of taxation, as well as the principles for granting tax reliefs and remissions, along with categories of taxpayers exempt from taxation, shall be by means of statute (art. 217). It means that only Polish Parliament is entitled to levy taxes or any other public duties and it could be done only in the legal form of the statute. Moreover the tax statute must regulate all elements of the construction of a tax: subjects of taxation, objects of taxation, taxable basis, rates of taxation and additionally tax exemptions and tax reliefs.[8]

In Poland double taxation conventions, as they are ratified international (bilateral) agreements, are considered as sources of universally binding law beside the Constitution, statutes, regulations and enactments of local law issued by the operation of organs shall be a source of universally binding law of Poland in the territory of the organ issuing such enactments. According to the Constitution of the Republic of Poland (art. 89 sec. 1) ratification of an international agreement by the Republic of Poland, as well as renunciation thereof, shall require prior consent granted by statute - if such agreement concerns:

1) peace, alliances, political or military treaties;
2) freedoms, rights or obligations of citizens, as specified in the Constitution;
3) the Republic of Poland's membership in an international organization;
4) considerable financial responsibilities imposed on the State;
5) matters regulated by statute or those in respect of which the Constitution requires the form of a statute.

An international agreement ratified upon prior consent granted by statute shall have precedence over statutes if such an agreement cannot be reconciled with the provisions of such statutes (art. 91 sec. 2 of the Constitution of the Republic of Poland). It means that the tax treaty is a part of the domestic legal order and it is applied directly. Moreover such a treaty has – in the event of a collision with the statute – the precedence over national law.

7) M. Lang, *op. cit*., s. 31.

8) Model Konwencji OECD. Komentarz, (ed.) B. Brzeziński, (2010), Warszawa: Oficyna Prawa Polskiego, pp. 69-72.

Typical double taxation convention allocates the taxing rights between the two contracting states in order to eliminate double taxation. The examples of such allocation rules of taxing rights might be as follow:

1) if a person (an individual or a body corporate) being resident of country A derives income from sources located in country B, this income shall be taxable only in the country of taxpayer's residence – country A; in this situation the B country (the source country of income agrees to refrain itself from taxation); this kind of allocation rule is applied in case of business income (with exeption reserved to a permanent establishment located in the source country) – i.e. art. 7 of the tax treaty concluded between Poland and Portugal (based on the OECD Model) and art. 8 – shipping, inland waterways transport and air transport (see also art. 8 of the tax treaty concluded between Poland and Portugal).
2) if a person (an individual or a body corporate) being a resident of country A derives income from sources located in B country, this income may be taxed in the B country – the source state; in this case the residence state A resigns from its taxing rights which are given solely to the other contracting state (country of source); the example of such allocation rule is the avoidance of double taxation of income from immovable property (art. 6 of the treaty concluded between Poland and Portugal), art. 7 paragraph 1 – business income in case where the business activity of a taxpayer in a foreign country meets requirements allowing it to be regarded as the permanent establishment located in the other country and art. 15 paragraph 1 – income from employment – where as the general rule – salaries, wages and other similar remuneration derived by a resident of a contracting state A from an employment performed in the other contracting state (state B) – shall be taxable only in the state where the employment was actually exercised.
3) finally the third example of the allocation rules of taxing rights is as follow: if a person who is a resident of A country derives income from sources located in B country, this income may be taxed in the A country (country of taxpayer's residence), but the source country (B state) still refrains its taxing rights within certain limits (so called limited right to tax at source – the tax paid in the source country cannot exceed 10% of the gross amount of the income); in this case both contracting states have the right to tax specific types of income – the residence state and the source state (the last one within the limits established by the treaty); in order to eliminate double taxation which still appears, the residence state – country A must allow the deduction of the tax paid by a taxpayer in the source state – B country from the tax calculated on the sum of domestic and foreign income in country A; the elimination of double taxation in

this case requires the application one of the two methods – the tax credit method; the finest example of such allocation rules can be found *inter alia* in art. 10 of the tax treaty concluded by Poland and Portugal (dividends), art. 11 – interest and art. 12 – royalties.

One concluding remark, in case where the treaty gives the exclusive right to tax a certain type of income or capital either to the country of taxpayers residence or the source state, the taxation there always depends on the domestic tax law regulations. If a certain type of income is exempt from taxation in one country and the tax treaty guarantees the exclusive right to tax it only to that country, tax authorities of that state cannot demand from taxpayer the tax to be paid only on the basis of the tax treaty provisions. In this specific and not very rare situation – the way in which contracting states have allocated between themselves the allocation rights will lead to the phenomenon called **double non-taxation**. [9]

IV. Methods for Elimination of Double Taxation in Juridical Sense - Polish drafts Practice

Double taxation convention allocates taxing rights between two contracting states. However the elimination of double taxation in juridical sense requires the application in the country of residence of the taxpayer deriving income from sources located in the other contracting state (the source country) suitable method of eliminating double taxation, as referred to in art. 23A and 23B of the OECD Model Convention. The exemption method (provided by art. 23A of the OECD Model) and the tax credit method (provided by art. 23B of the OECD Model) are widely used by countries in the world and these articles are addressed to the country of taxpayer's residence, where the application of a relevant method should take place. It should be emphasized that the tax treaty indicates only which of these above mentioned methods should be applied but the treaty itself does not govern the way in which the method is used; this is regulated at the level of the domestic tax law provisions of each countries.

The exemption method is used mostly in the treaty practice of some European countries like Austria, Belgium, Denmark, Netherlands. The exemption method realizes the concept of capital import neutrality (CIN). By choosing this particular method of elimination of double taxation, these countries send a very clear signal to their residents (domestic investors): go and invest, earn money abroad, income derived from foregin sources shall be tax exempt in the country of investor's residence, so taxpayers who have decided to invest abroad may compete on the same tax terms in the source country as domestic investors of that country. The exemption method applies where a taxpayer – resident of A country derivers income from sources in B country and on the basis of the tax treaty concluded between countries A and B, that income shall be exempt from taxation in A country (taxpayer's state of residence).

9) See: M. Lang, op. cit., s.31.

Worldwide there are two variants of the exemption method commonly used: full exemption and the exemption with progression. The full exemption – if applicable under domestic tax law provisions of taxpayer's country of residence means that income generated abroad is entirely excluded from the tax base in the country of residence of the taxpayer. This type of exemption is available in Poland in case of corporate income taxpayer's - residents of Poland, if the relevant tax treaty concluded by Poland exempts certain types of income derived by them in the foreign contracting state - under provisions of Art. 17 sec. 1 point 3 of the Corporate Income Tax Act from 15th February 1992.

The second variant of the exemption method is commonly known as the exemption with progression. Its application requires the application of the progressive scale of taxation in taxpayer's country of residence. In other words, the residence state of a taxpayer is allowed to take into account the foreign exempt income in calculating the amount of the tax on the remaining (domestic sourced) income. In Poland the exemption with progression is provided by provisions of Art. 27 sec. 8 of the Personal Income Tax Act from 26th July 1991. The exemption with progression requires to take the foreign sourced income (tax exempt in the country of taxpayer's residence on the basis of the treaty) into account in order to calculate the rate of taxation applicable only to domestic sourced income.

The application of exemption with progression method in Poland, as regulated in art. 27 sec. 8 of the PIT Act requires on the first place the domestic and foreign sourced income to be added. The taxable basis is then composed both from domestic and foreign sourced income. Then it requires the tax to be calculated as provided in the progressive tax scale regulated in Article 27 Sec. 1 of the PIT Act. The next step is the calculation of the tax rate, which is going to be applicable solely to domestic sourced income. This tax rate is the ratio, expressed as a percentage of the amount of tax calculated on domestic and foreign income to the sum of domestic and foreign income.

The following example illustrates the mechanism of the exemption method:

The progressive scale of taxation in Poland – article 27 sec. 1 of the PIT Act:

The taxable basis in PLN		**The amount of the tax is:**
From	To	
	85 528 PLN	18 % minus the amount decreasing of the tax 556, 02 PLN
85 528 PLN		14 839,02 PLN + 32 % of the excess over 85 528 PLN

The example:

Mr. Kowalski, resident of Poland earned in taxable year of 2011 income from domestic sources in the amount of 50,000 PLN and income from sources located in Portugal in the amount of 75,000 PLN. According to the tax treaty concluded by Poland with Portugal, the Portuguese sourced income shall be exempt from

taxation in Poland. So Mr. Kowalski knowing that Poland applies the exemption with progression method in this case, shall calculate his tax in Poland as follow:

1) First he must add domestic income to Portuguese income – 50,000 PLN plus 75,000 PLN – which gives 125,000 PLN;
2) Mr. Kowalski has to calculate the tax on the total amount of his income (domestic and foreign) using the progressive scale of taxation demonstrated above: 14,839.02 PLN plus 32% x (125.000-85.528) = 27,470.06 PLN.
3) Then Mr. Kowalski has to calculate the tax rate applicable only to his domestic (Polish) sourced income – to fix the proportion between the amount of the tax calculated in the point 2 to the sum of domestic and foreign income calculated in point 1):
   125,000PLN - 100%
   27,470,06 PLN - x %
   The result is 21,97%
4) The ratio of 21.97% is the tax rate applicable only to domestic sourced income of Mr. Kowalski's.
5) So the tax to be paid in Poland is: 50,000 PLN x 21.97% = 10.985 PLN.

The tax credit method, also called as the deduction method, is used by the country of the taxpayer's residence, if income from foreign sources is not tax exempt on the basis of the tax treaty concluded with the source state, but it was taxed there and is also taxable in the residence state. By taxing foreign sourced income which has been already taxed at source, the country of the taxpayer's residence must allow taxpayer to deduct the tax paid abroad. The proper application of the tax credit method requires the amount of the foreign tax paid abroad to be known.

The tax credit method is preferred in the treaty practice of the Anglo-Saxon countries (Australia, Canada, New Zealand, United States and Great Britain and Northern Ireland). The essence of this method is to ensure that in the State of the taxpayer's residence the concept of capital export neutrality (CEN) is realized. In contrast to the exemption method, the tax credit method provides for resident taxpayers the opportunity to compete on the same tax terms in the country of theirof residence. This means that no matter where – home or abroad – the taxpayer derives income or owns a property, it shall always be taxable in the state of their residence. Choosing the tax credit as the basic method for elimination of double taxation, the country does not promote its own residents who decided to invest abroad in comparison to its residents who invest solely in domestic sources. The effect of application of the tax credit method is the equalization the level of tax burdens of income derived abroad with domestic sourced income.

On the same grounds as the the exemption method, there can also be distinguished two variants of the tax credit method. The first is full tax credit (full deduction of the foreign tax paid abroad) – which is not applied by countries in the treaty

practice, because it is seen as very expensive from budgetary reasons, especially if the tax paid abroad is higher than the tax due on the same category of income in the country of residence of the taxpayer. To allow taxpayers in the latter case to deduct fully the amount of the tax paid abroad would mean for the taxpayers' residence state a sort of subsidizing of the budget of the source state.

The second variant of the credit method is the ordinary tax credit. It allows the taxpayer to deduct the foreign tax, however such deduction in either case shall not exceed that part of the income tax – as calculated before the deduction is given (i.e. the tax calculated from the sum of domestic and foreign income) – which is attributable – as the case may be – to the foreign sourced income. In other words the ordinary tax credit method sets certain limits of deduction of the foreign tax. If *de facto* the tax paid abroad is higher than a tax which would have been paid in case from the same type of income derived from domestic sources, the excess is not creditable (deducted). On the other hand, if the tax actually paid abroad is lower than the tax which would have been paid in case from the same type of income derived from domestic sources, the taxpayer is allowed to deduct the whole amount of the foreign tax.

Poland, like the other OECD Member States, applies the ordinary tax credit method. This method is provided by Article 27 Sec. 9 and Sec. 9a of the PIT Act in case of individual resident taxpayers and in Article 20 Sec. 1 of the CIT Act in case of corporate income taxpayers. In addition, Poland uses the ordinary tax credit method as the unilateral method for elimination of double taxation in the juridical sense where there is no double taxation convention concluded by Poland with the source state (Art. 27 Sec. 9a of the PIT Act).

The application of the ordinary tax credit method shall be illustrated by following example:

Example:

Mrs. Kowalska, resident of Poland earned in taxable year of 2011 income from domestic sources in the amount of 50,000 PLN and income from sources located in Portugal in the amount of 75,000 PLN. According to the tax treaty concluded by Poland with Portugal, the Portuguese sourced income shall not be exempt from taxation in Poland. Mrs. Kowalska has paid the income tax in Portugal at the rate of 23,5%. So the foreign tax to be credited in Poland is the equivalent of 17,625 PLN.

So Mrs. Kowalski knowing that Poland applies the ordinary tax credit method in this case, shall calculate his tax in Poland as follow:

First she must add domestic income to Portuguese income – 50,000 PLN plus 75,000 PLN – which gives 125,000 PLN;

Mrs. Kowalska has to calculate the tax on the total amount of his income (domestic and foreign) using the progressive scale of taxation demonstrated above: 14,839.02 PLN plus 32% x (125.000-85.528) = 27,470.06 PLN.

Then Mrs. Kowalska has to calculate the part of thethe income tax – as calculated before the deduction is given (i.e. the tax calculated from the sum of domestic and foreign income) – which is attributable – as the case may be – to the Portuguese sourced income:

27,470.06 PLN x 75.000 PLN : 125, 000 PLN which gives the amount of 16,482.03 PLN – this is the limit of deduction of the Portuguese tax paid by Mrs. Kowalska .

So the deduction within the limit calculated in point 3) is: 27,470.06 PLN minus 16,482.03 PLN = 10,988.03 – the amount of the tax to be paid in Poland.

V. Concluding remarks

In its treaty practice Poland follows the OECD Model Tax Convention and applies both methods eliminating it: the exemption and the tax credit method. The finest example of the application of the exemption with progression method in the Polish treaty practice is income from employment exercised abroad by Polish residents, which is provided in the tax treaties concluded by Poland with Albania, China, Croatia, Cyprus, Estonia, France, Greece, Indonesia, Ireland, Canada, Lithuania, Latvia, Portugal, the Czech Republic, the Federal Republic of Germany and the Slovak Republic, Slovenia, Turkey, Ukraine, Italy and United Kingdom of Great Britain and Northern Ireland. The ordinary tax credit method for the same category of income (income from employment) is provided in bilateral agreements concluded by Poland, among others with the Russian Federation, the Netherlands, Kazakhstan and the United States of America.

The choice of an appropriate method for elimination of double taxation by a Contracting State in the tax treaty concluded with the other Contracting State shall not remain indifferent to the amount of the burden of taxpayers in their country of residence. In many cases the ordinary tax credit method is not neutral for taxpayers, especially if the tax paid abroad is higher than the limit of deduction calculated in the taxpayer's country of residence. The importance of these issues lead (led? Past simple) Poland to renegotiation of some of its tax treaties concluded with some Member States of the EU after accession of Poland to the European Union and the opening of the labor markets in these countries for Polish resident taxpayers (i.e. tax treaty concluded with the United Kingdom) and even to introduction of a special tax legislation providing the tax abolition (the Act of July 25, 2008 with special solutions for taxpayers receiving some revenue out of the Polish Republic (Journal of Laws No. 143, item. 894), commonly known as the Law of the tax amnesty. This Act applies to Polish resident taxpayers - who in taxable years 2002-2007 received income from employment, income from independent personal activities etc. in countries with which Poland has concluded a double taxation treaty providing for elimination of double taxation the ordinary tax credit method (Austria, Denmark, Belgium, Finland, the Netherlands, Sweden and the United Kingdom and Northern Ireland). Taxpayers, residents of Poland who have not submitted a tax return for

one of the tax year mentioned above and have not paid tax on foreign sourced income, were allowed to submit the tax return and calculate their tax liability in Poland using the exemption with progression method rather than the ordinary tax credit provided by the tax treat. Taxpayers who declared taxable income in Poland and paid the tax calculated with the application of the tax credit method could also benefit from exemption with progression method and recover some of the tax paid in Poland.

References

Brzeziński, B. (Ed.) (2010). Model Konwencji OECD Komentarz. Warszawa: Oficyna Prawa Polskiego, 69-72.

Lang, M. (2010). *Introduction to the Law of Double Taxation Conventions.* Wien: Linde, 23-26.

Hamaekers H., Holmes, K., Głuchowski, J., Kardach, T. & Nykiel, W., (2006). *Wprowadzenie do międzynarodowego prawa podatkowego,* Warszawa: LexisNexis.

James, S. & Nobes, C., (2012). *The Economics of Taxation: Principles, Policy and Practice 2012/13.* Edinburgh: Pearson Education.

Litwińczuk, Red.Hanna (2009). *Podatki bezpośrednie. Prawo polskie a prawo wspólnotowe. Implementacja dyrektyw orzecznictwo ETS*. Warszawa: Oficyna Prawa Polskiego.

Loncarevic I. (2005). Economic Relevance of Double Taxation Conventions, In Marcus, Stefaner, Züger, Mario *Tax treaty policy and development*. Wien: Linde Verlag, 19-20.

OECD (2005). The OECD Model Tax Convention on Income and on Capital. Condensed version and Key Tax Features of Member Countries. Paris: OCDE.

Zasiewska, M., Oktawiec, A. & Chorązka, J. (Eds.) (2011). *Umowy o unikaniu podwójnego opodatkowania. Komentarz.* Warszawa: Wolters Kluwer Business, 462-480.

Environmental policy: economic and market-based instruments for environmental protection

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Abstract

The environment plays an important role in the economy and can contribute to make the business sector more dynamic, hence the importance of state policies that affect the environment.

This paper will outline the different instruments available to public administration in order to enable environmental control of productive activities and promote good conduct in favour of environmental conservation.

Keywords: ***Environmental economics, environmental policy***

1. Introduction

The environment plays a series of functions in the economy: it is a fundamental source of resources; the natural system offers services related to the enjoyment of the environment; and it is the recipient of waste material from production and consumption activity (Pearce & Turner, 1990).

All these functions are economic functions as they all have a positive economic value. If we bought or sold them in the market, they would all have positive prices (Pearce & Turner, 1990); thus a park has an economic value as does any other natural asset. The dangers arise from the incorrect usage of the environment as we do not acknowledge the positive prices of these economic functions.

As we all know, the economy only takes care of limited resources. The rational usage of natural resources becomes important through its scarceness or even exhaustion. Society's objective is to maximize its well-being from a set amount of limited resources onwards. Since there are market failures in some cases, such as external costs, the market cannot always achieve this objective. In these situations the allocation of productive resources is not realized efficiently by the market and state intervention is required to achieve this objective.

The environment is important to the economy. A more rational utilization of natural resources would not only achieve a greater socio-economic welfare, but it would also contribute to a more dynamic business sector, hence the importance of state policies that affect the environment.

1.1 State Intervention

The State governs all common assets: radioelectric space, roads, mines, rivers, beaches, etc. The authorities have a general interest purpose. Their objective is to offer services and goods to the community. Their capacity as regulator of all common assets is legitimized because of public interest. Furthermore, all authorities have a constitutional mandate to protect the environment. In this way, all citizens in general and particularly all authorities are entrusted with protecting the environment both in the Spanish constitution and in the constitution of neighbouring countries.

Within the European Union, the environment acquires policy status with the Treaty on European Union (TEU). One feature of environmental policy is its transversibility. This means that the objective of protecting the environment must be part of the definition and realization of all authorities in every conduct.

2. Environmental Policy Instruments

An environmental policy is a public policy that has as its main objective the correction of this market failure (Austin, 1999). This will internalize the 'externalities' into the decision making process. It also aims at preventing the occurrence of contamination, and of any economic activity that may be detrimental to the natural environment. However, it not only adheres to this aspect, but also encompasses the preservation of animal and plant biodiversity, including landscape spaces and biotopes of special interest (Fernández-Bolaños, 1998).

To ensure that the environmental policy is upheld, the different administrative levels of the E.U., the Spanish State, the CCAA and the town halls themselves, have multiple instruments to ensure environmental control of productive activity. Within these instruments the following can be highlighted:

2.1 Legislative instruments

Legislative instruments consist of legal regulations or planification that dictate specific conduct to be followed. They regulate business activity and the environment by defining regulations relative to all products and/or procedures; limiting or prohibiting the emission of contaminating agents (gases, toxic liquids, noise pollution); restricting activity in geographical and/or temporal terms (e.g. maximum number of beds or hotel rooms); bestowing permission (permits and licenses), regulations that enforce or prohibit specific conduct (e.g. the development of certain high ecological value areas, or Coastal Law that regulates beaches and adjacent territory), or established fees or periods of grace. Non-compliance of these regulations incurs in fines or sanctions, measures which have been designed to act as a deterrent.

2.2 Economic Instruments

All economic instruments are those that have an effect on the costs and benefits of economic agents (OECD, 1997), and try to modify the subject's behaviour towards the environment favourably.

There are many key advantages to economic instruments in comparison to legislative instruments. However, there are situations in which restrictive regulation is more effective than economic instruments.

2.2.1 Fiscal Policy Measures

Fiscal policy measures are among economic instruments. The state has a wide margin of manoeuvre through fiscal policy to influence the economy of economic agents, whether it is through expenditure or income. In principle, the authorities will tax or penalize all conduct they want to eradicate via public income, and will reward all favourable conduct to the environment through public expenditure.

The authorities can bestow grants and subsidies for investments in technological advances. Other fiscal measures that manage pollution in our tax system are those mainly constituted through fiscal benefits, such as exemptions, levy rebates and allowances that entail relinquishment to part of public income, demanding that the beneficiary complies with good conduct towards the environment. For instance, since the 1997 tax year, Spanish company tax law has included a tax allowance motivating companies to invest in sustainable equipment and installations. This allowance is currently envisaged in the Sustainable Economy Law.

The European Union provides funds to finance environmental advances through different programmes, such as the instrument LIFE+finances measures that contribute to the development, application and updating of environmental community policy and legislation the programme LIFE+ contains three fundamental principles which are: preventative action; correction at source of environmental attacks; and those who contaminate will pay.

It is a reality that the ecological element is becoming more and more part of the legal system in the countries surrounding us. There are new impositions on various types of harmful substances to the environment. It is what we now refer to as the ecological fiscal reform, or 'green fiscal reform', a concept stemming from the theory of the British economist Pigou.

Some of the most used economic instruments are; environmental taxes, financial incentives, and negotiable emission permits.

These impositions are formulated around the principle that those who contaminate will pay. Other impositions try to increase the cost of using resources. They are intended to disincentive or modify conduct. All taxes have an important corrective function. By taxing productive and contaminating activity, it is assumed that the company will tend to reduce this activity. For instance, the emission of greenhouse gases can be reduced through fiscal policy.

2.2.2 Negotiable Emission Permits

Negotiable emission permits issued as economic instruments to protect and improve the natural environment, stem from the need to reduce emissions released by specific industries into the atmosphere, in order to comply with all commitments made under the Kyoto protocol.

2.2.3 Indirect Instruments

All statutory instruments are supplemented with indirect instruments. The authorities can incur in investments or expenses for the provision of infrastructure (public transport, waste collection, sewage treatment, etc.), protective measures and/or the conservation of places of interest (national and natural parks, historical monuments, etc.), or decisions concerning the regulation and management of the territory.

2.2.4 Environmental Criteria Included in Public Contracts

All environmental criteria included in public contracts refer to the purchase or hiring of goods or services, taking into account not only their technical or economic aspect, but also their environmental aspect.

According to 2005 data, public contracts account for nearly 13% of GDP in Spain. The authorities can freely choose what is to be purchased and can stipulate implementation clauses within the contract, i.e. how it must be performed. Thus, when purchasing a product or service, the authorities can consider criteria such as resource, energy or water management; reduction in waste production; request specific products or materials, e.g. demand the use of recycled materials for a specific job; request that the work and services suppliers have an environmental management system; or that the products purchased are ecolabel certified.

2.3 Market-based or voluntary instruments

Market-based or voluntary instruments are based on the population's rising environmental awareness, which demands a greater consumption of environmentally-friendly services and products. These types of instruments expect the market to be a self-regulating market, granting all environmentally-friendly companies a competitive advantage over those which are not, or excluding them altogether.

These instruments try to incorporate the environmental factor into the organisation of the company. This allows the organisation to identify and control the significant environmental aspects and their impact, and verify options for the reduction of resource or energy consumption.

As consumers do not have a laboratory at home to establish whether a particular company or organization is environmentally-friendly or not, there must be a corresponding body within the authorities that certifies companies compliance with environmental legislation.

The economic advantage for companies is that the production of ecological products can contribute to their differentiation from other products. These can include: environmental audits; environmental management systems, whether certified in accordance with the ISO 14001, the EMAS, ecolabels, etc.

The authorities are responsible for encouraging the market to be environmentally friendly via market-based or voluntary instruments. The European Union's environmental activity is accomplished through policies and Framework Programmes, the latest one being the sixth environmental Framework Programme, which stipulates all state members, must encourage a wider uptake of the Community's Eco-Management and Audit Scheme (EMAS).

There are instruments of preventative character and others of palliative character, such as environmental management systems.

Other instruments have an effect on the product, such as ecolabels. Others affect the productive process, such as environmental management systems.

2.4 Supporting instruments

The authorities have a fundamental instrument for promoting respect towards the environment through supporting instruments which try to increase the awareness of businesspeople, tourists and the general population, with regards to environmental problems relating to economic activity and the ways in which they can collaborate to reduce them. These initiatives include activities that raise awareness and circulate information; education and vocational training; and technical assistance for companies wanting to adopt more sustainable practices. The ´Clean Pyrenees Campaign' (which raises tourist's environmental awareness of the problems caused by the dumping of waste in the mountains), is an example of an awareness raising campaign in Spain. Other examples are the forest fire prevention education campaigns.

The City of Madrid programme 'Green Move', which affects Madrid, tries to identify, acknowledge and circulate best practice in sustainable mobility. One of its main characteristics is that it can be replicated by other institutions. Particularly, through the degree of generalization this practice could achieve among other assimilable organisations when identified as a successful practice, and the provision of information enabling knowledge transfer.

3. Conclusions

The authorities have a wide margin of manoeuvre when it comes to protecting the environment. The particular circumstances of each situation, and nature of each problem in question, will determine which suitable instrument is selected.

Not every policy is legislation, for example, an education or awareness policy can be just as effective as establishing an ecological tax.

References

Austin, D. (1999). *Economic Instruments for Pollution Control and Prevention – A Brief Overview.* World Resources Institute. Retrieved March 21 2013 from http://pdf.wri.org/incentives_austin.pdf

Buñuel González, M (1999). *El uso de Instrumentos económicos en la Política del Medio Ambiente*. Madrid: Consejo Económico y Social.

Fernández-Bolaños Valentín, A. (1998). *Incidencia de la Política ambiental en la actividad económica*. Madrid: Universidad Complutense de Madrid.

Manual para la formación en medio ambiente (2008). Valladolid: Editorial Lex Nova.

OECD (1997). *Evaluating Economic Instruments for Environmental Policy*. Paris: OECD.

Pearce, David y K. Turner (1990). *Economics of Natural Resources and the Environment*, London: Harvester Wheatsheaf.

Programme "Muévete Verde". Madrid: Ayuntamiento de Madrid.

Sixth Environment Action Programme. Retrieved March 21 2013 from http://ec.europa.eu/

Villamil Serrano, A. & Maties García, J. (2011). Política *económica del medio ambiente*. Madrid: Editorial Universitaria Ramón Areces.

Government Laws

Ley 2/2011, de 4 de marzo, de Economía Sostenible. (B.O.E. 5 de marzo de 2011).

Ley 30/2007, de 30 de octubre, de Contratos del Sector Público (B.O.E. 31 de octubre de 2007).

Orden pre/116/2008, de 21 de enero, se aprueba el Plan de Contratación Pública Verde de la Administración General del Estado y sus Organismos Públicos, y las Entidades Gestoras de la Seguridad Social. (BOE de 31 de enero de 2008.)

Agricultural Sciences and Natural Resources

Analysis of commodity for some yoghurt assortments sold on Iasi City market, Romania

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Abstract

The authors try to realise an analysis of commodity for some yoghurt assortments sold on Iasi market and to present to consumers all the information which must be marked on: fat content, nutritive value, shelf life, storage temperature, ingredients, producer, distributer, bar code, stamp of veterinary-sanitary authority. The product design is also a very important aspect.

For fat content two methods were used: acid-butyrometric and colorimetric. Five different assortments of yoghurt were studied. Acid butyrometric method leads to mean values of fat percent between 2.66% and 2.76%. Colorimetric method leads to mean values of fat content between 2.640% and 2.762%.

The data presented on the labels are in accordance with the Romanian and EU legislation for all the analysed products.

Keywords: ***analysis, consumer, fat percent, label design, yogurt***

Introduction

Romanian milk market seems to be around 1.5 billions litres and offers three big types of assortments: ultra-pasteurized milk (UHT); pasteurized milk and milk without any industrial processing. UHT milk together with the pasteurized one have a share of 10% from Romanian market while the rest of 90% is represented by the industrial unprocessed milk (Pop, 2004; Pop & Pop, 2006).

Consumer is on a central place level in the strategy regarding quality of food-stuff, being the trade and production "engine". In any modern economy, orientation to customer is one of the fundamental principles of food-stuff quality management (Avarvarei, 2011; Pop, 2004; Pop & Pop, 2006). Food-stuff quality is one of the basic elements regarding efficiency and competitiveness (Avarvarei, 2011; Pop & Pop, 2006).

Having in view the above mentioned things we aimed to carry out a commodity study of some assortments of yoghurt sold on Iasi City market.

Material and methods

In the analysis a number of five yoghurt assortments were taken, with 2.8% fat percentage marked on label.

The studied assortments of yoghurt were:

- Covalact de tara, produced by S.C. Covalact S.A Sfantu Gheorghe, Covasna County (figure 1);
- Vio, produced by S.C. Ilvas S.A Vaslui, Vaslui County (figure 2);
- Delisio, produced by S.C. Promilch S.R.L Podu-Iloaiei, Iasi County (figure 3);
- Natura, produced by S.C. Lactate Natura S.A Targoviste, Dambovita County (figure 4);
- Five Continents, produced by Five Continents Group Rachiti, Botosani County (figure 5).

The first step of the analysis of commodity for this product aims to determine the fat content for five yoghurt assortments produced by different brands which sell their products on Iasi City market. To make a sober analysis five samples were achieved from each brand, each sample being gathered from a different location. Fat content was analysed to view if there were differences between the value marked and presented to consumer on label and the real fat content. Tests were carried out in the Laboratory of "Milk and dairy products processing" discipline, Faculty of Animal Sciences, University of Agricultural Sciences and Veterinary Medicine from Iasi, Romania. The analysis of fat content was carried out through two methods, as follow: acid-butyrometric method (Guzun, 1998; Usturoi, 2012; Vacaru Opris & Usturoi, 1994) and colorimetric method (using an Ekomilk device) (Usturoi, 2012; Vacaru Opris & Usturoi, 1994).

The second step of the analysis of commodity for yoghurt aimed at an analysis of the label for each product having in view the Romanian and European Union legislation regarding labelling of milk products.

Figure 1: Covalact de tara, *produced by S.C. Covalact S.A Sfantu Gheorghe, Covasna County, packed in 150 g plastic glasses (original photo)*

Figure 2: Vio, *produced by S.C. Ilvas S.A Vaslui, Vaslui County, packed in 370 g plastic glasses (original photo)*

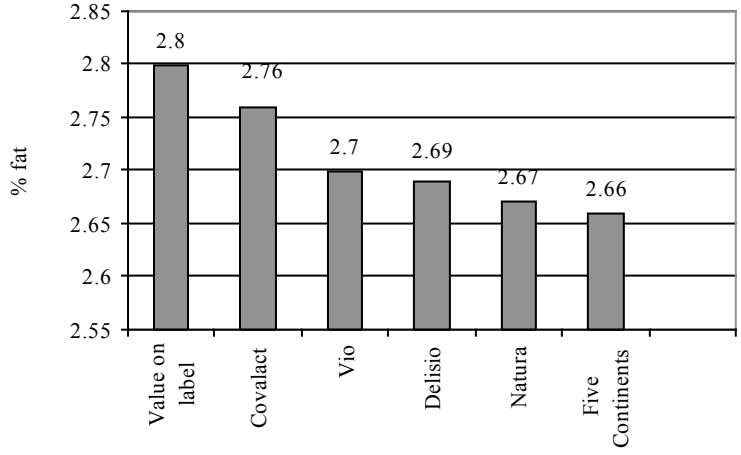
Figure 3: Delisio, *produced by S.C. Promilch S.R.L Podu-Iloaiei, Iasi County, packed in 200 g plastic bottles (original photo)*

***Figure 4**: Natura, produced by S.C. Lactate Natura S.A Targoviste, Dambovita County, packed in 200 g plastic glasses (original photo)*

***Figure 5**: Five Continents, produced by Five Continents Group Rachiti, Botosani County, packed in 200 g plastic glasses*

Results and discussion

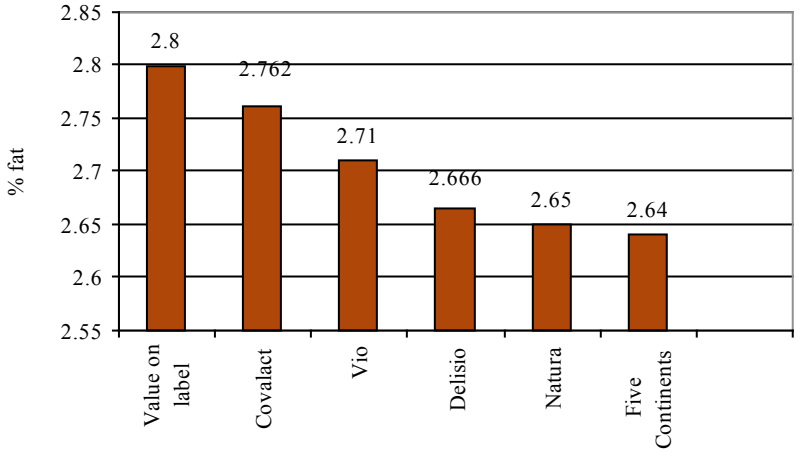
Graph 1 presents the results obtained after determination of fat percent using acid-butyrometric method (investigation on own sample) for the five studied yoghurt assortments.



***Graph 1**: Fat percent of the analysed yoghurt (own sample)*

Fat percent (control percent) is 2.8% which is the one which appears on all the labels of the studied yoghurt assortments. It could be observed that the mean value of those five samples was very close to the fat percent marked by each producer on the label (2.8%). Mean values of fat percent varied between 2.66% (Five Continents) and 2.76% (Covalact de țară). It could be mentioned that fat content was very close to the values presented by each producer.

The effectuated analysis was repeated to certify the results obtained for fat determination through acid-butyrometric method (on own sample) using the same acid-butyrometric method but this time on a diluted sample. In graph 2 the results obtained at this determination are presented.



***Graph 2**: Fat percent of the analysed yoghurt (diluted sample)*

Also at the analysis of fat content using acid-butyrometric method (diluted sample) we obtained close values to the one of 2.8% marked on each label. Mean values of fat percent were between 2.640% (Five Continents) and 2.762% (Covalact de țară). Comparing the data regarding the determinated fat percent using both methods, own sample and diluted one, it could be observed that the values were very close which prove that the analyses were done correctly and in accordance with the working method procedure. Differences weren't higher when compared with the value of 2.8% fat marked on label, with the exception of Five Continents yoghurt where the fat percent was the smallest one of only 2.640%.

In the second part of the paper we present an analysis of commodity which has in view an analysis of each label of the products.

Yoghurt ***Covalact de țară*** offers information regarding fat content (2.8%), and provides data about nutritive value per 100 grams of product. Shelf life time is marked in a visible place on the aluminium foil which wraps the plastic glass. It could be found the bar code and the storage temperature. Information regarding distributer is given and also the ingredients which were used (homogeneized and

pasteurized cow milk, selected lactic cultures) are mentioned. On the glass it is marked the stamp of the sanitary-veterinary authority. Also the label has a motto which encourages the consumption of the product due to the fact that this one respects the traditional technology. The design of the glass and respectively of the aluminium foil is attractive being a combination of white with green, and we can also find the logo of the brand, and a stylized rural landscape. Packaging is processed in plastic glasses with a capacity of 150 grams.

Vio – yoghurt provides information regarding fat percentage (2.8%), mean nutritive value of 100 grams of product. It has the bar code, the seal of the sanitary-veterinary authority and the product storage temperature. Shelf-life time is marked on the aluminium foil which covers the glass. We can also find information regarding the producer. Information regarding the utilised ingredients (cow milk and selected lactic cultures) is provided. The design of the box is quite attractive in basic colours of blue and white, with some red shadows. Packaging is prepared in plastic glasses with a capacity of 370 grams.

Yoghurt ***Delisio*** is packed in plastic glasses of 200 grams. It offers information regarding: storage temperature, nutritive value per 100 grams of product, fat percent, utilised ingredients (pasteurized cow milk and selected lactic cultures), producer. Both the bar code and also the seal of the sanitary-veterinary authority can be found. The shelf-life time is marked on a very visible place on the foil which covers the glass. We could observe the logo of the product and also the firm brand. The design of the packaging box is interesting, on a stylised background, being provided all the necessary information for the consumer.

Yogurt ***Natura*** also presents information regarding fat percentage (2.8%), offering data regarding the mean nutritive value per 100 grams of product. Shelf-life time is marked on the aluminium foil which closes the glass. We could find the bar code and the storage temperature of the product. Information regarding producer and also about the utilised ingredients is provided. On the glass the seal of the Romanian sanitary-veterinary authority is visible. The design of the label is done on a background which represents a mountain area, the colour combination being blue-white-green. It could also be found the logo of the firm. Packaging is done in plastic glasses with a capacity of 200 grams.

Five Continents offers information regarding fat percentage (2.8%), mean nutritive value per 100 grams of product. Also at the other analyzed yoghurt assortments the shelf-life time is marked on a visible place. the bar code and the storage temperature of the product could also be found. information regarding the product is written down. On the label it is also the seal of the Romanian sanitary-veterinary authority. Information regarding the utilised ingredients (pasteurized cow milk and selected lactic cultures) is given. A logo is used – "*Calitate de cinci stele*" = "*Five star quality*" –, and the product design is not so attractive, the basic colour being white. Packaging is also done in plastic glasses with a capacity of 200 grams.

In our opinion, regarding the labels' design, the analysed products ranked in the following order: 1. Covalact; 2. Vio; 3. Delisio; 4. Natura; 5. Five Continents.

Conclusions

At the end of the current study regarding the commodity analyses for yoghurt assortments sold on Iași city market the following conclusions could be drawn.

1 The dairy milk products market is very diversified both on the number of sold assortments and also from the point of the existing firms on the market;
2 Obtained values for fat content of "yoghurt 2.8% fat" assortment were very close to the value marked on label being between 2.66% (yoghurt Five Continents, producer Five Continents Group) and 2.76% (yoghurt Covalact de țară, producer S.C. Covalact S.A);
3 The analysed product (yoghurt) was in accordance with the legislation according labelling. It could be found useful information for consumers such as: fat content, nutritive value of the product, shelf life, used ingredients, dates about producer and distributer, certification of a veterinary-sanitary authority, bar code, storage temperature, etc.;
4 Brands of which products were analysed provide additional information regarding: the used technology, firms' motto and logo, and its brand;
5 We consider that the capacity of the glasses is suitable for the consumers due to the fact that the product could be consumed at one meal;
6 From the point of view of attractiveness of label design, in our opinion, the classification is as follows: 1. Covalact; 2. Vio; 3. Delisio; 4. Natura; 5. Five Continents.

On the basis of the current study we can propose a series of recommendations for improving the labelling design of the boxes so they can be more attractive for the consumers and also to eliminate some drawbacks as regarding the right labelling of the products.

For yoghurt ***Five Continents*** the producer Five Continents Group Rachiti, Botosani County must try to make another design of the label which must be more attractive than the current one.

Also the other labels of the studied assortments could be improved so the design could become more attractive, by, for example, mixing different colours and also improving the shape of the plastic glasses.

References

Avarvarei, B.V. (2011). *Studiu privind caracteristicile merceologice ale unor produse din lapte.* Lucrare de disertatie, Iași: USAMV.

Guzun, Valentina (1998). *Tehnologia laptelui și a produselor lactate: lucrări de laborator și practice*. Chișinău: Civitas.

Pop, Cecilia (2004). *Merceologia produselor alimentare*. Iaşi: Editura TipoMoldova..

Pop, Cecilia & Pop I.M. (2006). *Merceologia produselor alimentare*. Iaşi: Editura Edict Production.

Usturoi, M.G. (2012). *Controlul laptelui şi a produselor derivate*. Iaşi: Editura Pim.

Vacaru, Opriş I. & Usturoi M.G. (1994). *Tehnologia industrializării produselor de origine animală*. Caiet de lucrări practice. Iaşi: UAI.

Different ways of Spanish viticulture: Jerez.

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Abstract

Viticulture in Spain has been deeply rooted for thousands of years. Some of Spain's wine regions are considered among the best and have achieved great prestige and recognition abroad in recent decades. It has some of the largest vine areas and is the third largest producer of wines worldwide and has had a recognized quality system (D.O.) since 1932.

Our viticulture includes traditional training systems, irrigation systems, fertilizer programs and crop and soil management.

This paper is included as a lesson within a series of classes about different areas of Spanish viticulture. This paper is a brief introduction to Spanish viticulture of Jerez and exposes examples of one of the most emblematic D.O. quality marks: and their evolution up to today.

Keywords: ***Jerez, viticulture, aserpiado, Jerez pruning, Palomino.***

Spanish Viticulture

Spain is the first vineyard in the world (close to 1 M ha) dedicated to processing grape-wine (98.5%). Castilla La Mancha is the largest region (about 0.5 M ha). Due to the end of the grubbing up program, surface area of vineyards was decreased (<100Kha) mainly during recent years (2010-2011). Spanish total production is close to 50 MHl wine, which means more than 6 MT grapes.

Within the country, the surface ranking is as follows: La Mancha>Rioja>U tiel>Cataluña>Cava…but there is a more indexed relationship to quality and yield: the ratio between viticulturists and wineries ranking: Rioja> La Mancha> Valencia>Utiel>Bierzo> Jerez…

Spain is situated in the world ranking as the largest worldwide vineyard area (1st) of grape production; 3rd in wine production only surpassed by France and Italy. However, year after year, Spain is placed 7th, 8th, 9th in absolute terms of exported wine. In 2011, Spanish wine exports increased from 10-26% of their value.

Spanish production areas are regulated by current vine and wine law (24/2003), which is based on two previous documents: "Wine Statute" (1932) and "Vine, wine and alcohol statute (25/1970)". It is also remarkable that the D.O. system created in 1932 currently defines more than 80 Qualified regions with specific production conditions ("*Denominación de Origen*" and "*Pagos*").

Vineyard conditions: total irrigated vineyards are close to 35%, and 65% are dry or not irrigated. The most commonly used system is drip irrigation (with more than 300.000 ha of total, 345.000ha). Main soil management is minimum soil management (*laboreo mínimo*; 62,5%) and traditional management (*laboreo*, 26,5%), but nowadays soil cover management (<10%) is increasing its presence in Spanish vineyards.

Finally, some data indicate that this sector is not running as well as it could be: Spanish wine consumption is 10.5 l/year and the average bottle price of 1.6€ is low. However, the export rate increased during the last few years (+6-10%), giving Spanish producers a chance to develop. Cava, Rioja and La Mancha are the leaders in export rates, in terms of total Hl of wine.

Jerez Viticulture

Climatic and soil conditions

Jerez was the first D.O. in 1932: Jerez-Xères-Sherry, Manzanilla de Sanlúcar de Barrameda, and includes about 10,000 ha of vineyards, located in 9 villages and more than 3,000 viticulture and cellar owners. Jerez is the southernmost wine region in Europe greatly influenced by the Atlantic Ocean which provides a regular annual Tm: 17,3 ºC. Average precipitation is approximately 620 l/m2 and the ETP average is no more than 1,100 mm/year (because irrigation necessity between the months of Apr-Sep is 250 mm, many viticulturists do not usually irrigate). Jerez also has more than 170 sunny days or 3,200 h per year.

The most important climate characteristics are cool winters (4 ºC) and warm summers (40ºC), due to two predominant winds: Poniente (cool and wet; 95%HR and more frequent) from the west and the Levante (warm and dry; 30%HR and less frequent) which can cause sun burning in the cluster and vegetation.

Jerez and "Manzanilla de San Lucar de Barrameda" are the most important D.O. in spirits and liquor wines, accounting for 80% of the total and exporting over 75% of their production. On the other hand, D.O. Moriles-Montilla supposes less than 10% of the total national production and raises no more than 7% in exterior sales.

Likewise, the quality key factors in Jerez suppose that different zones are classified in two regions (superior vs. zone) according to:

- sunlight and wind exposure;
- proximity to the sea: Air humidity (sea factor) is important in order to retain water in vine and soil;
- altitude (increase to the west);
- albariza (soil type) content.

Albariza soil is a white clay-sandy soil (alba) originated from diatomeas sedimentation. It has a CaCO3 high content (25-40% active lime), high porosity and adequate soil moisture retention too. It is considered to be the best quality soil in the Jerez region. Other characteristics are their low content in O.M. (0.5-1.5%), N (0.2-0.8%), P2O5 (0.1-0.25%) y K2O (0.2-0.3%), a basic soil (pH 7 – 8.5) and its texture leads in the following classification: 40-60% clay, 20-30% silt and 10-20% sand.

Finally, there are other kinds of soil: Arenas (sands), located in coastal areas, formed by sand and clay (less than 20% active lime). Barros (muds), located in valleys, formed by clay, sand, active lime and high O.M. (dark color and high fertility).

Plants and cultivars

In the beginning, the first cultivars were Palomino, Mantuo, Albillo, Perruno (70%) and Pedro Ximenez, Calona, Cañocazo, Ferrar, Moscatel, Jaén, Tintilla, Beba (30%).

After European phyloxeric invasion (1894), cultivars distribution was as follows: Palomino, Mantuo, Perruno (85%) and Pedro Ximenez, Albillo, Moscatel (15%). Today, Palomino is (85%) considered like the first cultivar planted in the Jerez region followed by Pedro Ximenez and Moscatel (15%).

To be D.O. Jerez only three cultivars are authorized: Palomino, Pedro Ximenez and Moscatel (only for Moscatel wines).

Palomino Fino is the main cultivar in the Jerez region and it has large clusters and a medium sized grape, with a light green and pale colour. The average sugar contents is 11º Bé, and the total acidity average is 3.7 g/l. Its ripening-harvest date is over 15 September. There is another Palomino variety called Palomino de Jerez,

but it is a minority cultivar (with average sugar content is 11.1º Bé and total acidity average is 4 g/l) which ripening is early than the other (ripening date: 10 September).

Pedro Ximenez is a cultivar used for sweet wines. It has a high content in TSS (12.8º Bé) compared to the others. Its total acidity average is 4.5 g/l. The grapes have a smooth skin and few numbers of layers (*soleo*) and a late ripening. Also, it has a bad Jerez pruning adaptability and is very sensitive to Mildiu and Botrytis.

Moscatel (Chipiona o Alejandría) is a variety used for sweet wines too, because it is a kind of terpenic variety. It has a regular TSS (11.7º Bé) and its total acidity average is over 4.1 g/l. That cultivar is easily planted in cost areas (sandy soil) and has an early ripening date (6-10 September).

Finally, the main rootstock used in Jerez is 13-5 EVEX. (Berlandieri Resseguier) for its high vigour and resist until 35% active lime. Other rootstocks (but in less use) are: 161-39C (high vigour, 25% active lime, tilosis), 41B (Chasselas x Berlandieri) 40% active lime, not wet soil and 333 EM, (Berlandieri x Colombard).

Cultivation system

In Jerez there is a special cultivation process which increases the value of wine. Some of the most important processes are described below:

1. Soleo: is a sun-dried raisin process. The clusters are watered in a solution made from the ashes of wood burned for 5 minutes (skin cured). Clusters are placed on cereal straw on the floor. Musts with more than 13-15 ºBé are produced with this method.
2. Rootstock planting and bud grafting or basal "head" (like alternative solutions if green grafting falls the year before) separate in time, because there is no common method directly graft plants.
3. Aserpiado Process. A great solution to maintain rainfall water in soil, to prevent erosion and cause a progressive reduction of pesticides used, increasing the integrated production.
4. Jerez pruning. A special pruning based on traditional Jerez system: shoot and spur (vara y pulgar), leaving no more than 8 buds per shoot for Palomino cultivars. Two alternative cordon per year (right and left): spur and shoot. Spur: 1-2 buds and Shoot <8 buds. This is not a kind of Guyot pruning because there are two branches, but not only formed by a spur, each year you have a cane left on the other side of the plant.

Also, the D.O. gives their own recommendation in order to follow their rules: Production no more than 30-35 years. Only 7-9 clusters per shoot. The production is limited: 3 Kg/vine and 3,500-4,000 vines/ha, which means no more than 80 Hl.

In conclusion, the typical vineyard in Jerez can be described by using these parameters: 30-35 years average age vineyard. Albariza and Aserpiado are soil key factors. Varieties: Palomino, Pedro Ximenez and Moscatel. Plants are grafted in

vineyard directly. Jerez Pruning is original and specific. Average Ripening: September. Total Average Baumé: 11-12.5º (this value is higher if grapes are placed into a soleo process) and nowadays, over 80% of harvest is manual.

References

García de Luján, A. (1996). *La Viticultura del Jerez*. Madrid: Mundiprensa, 1-164.

Lissarrague García-Gutiérrez, José Ramón, Martínez de Toda Fernández, Fernando (2010). Cuestiones referentes al sector del viñedo más relevantes para la definición de la política de seguros agrarios: situación actual y tendencias a corto y medio plazo. In *Informe Viticultura*. Madrid: Ed. ENESA. UPM-UR 1-120

Varios (2012). *Dossier de Viticultura española*. Valencia: Ed. Semana Vitivinícola 1-7.

Varios. (2010-2011). *Estadísticas anuales Vitivinícolas*. Madrid: Ed. MAGRAMA.

Chemistry

Spectral Analysis of Metals and Alloys

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Abstract

Spectral analysis can be used to detect, identify or quantify materials and their chemical composition. The first part of the paper explains the principle of spectral analysis and then describes several spectroscopic methods to analyse chemical composition of metal and alloys. The second part deals with selected spectral analysers and explains the practical principle of work of spectral analyser SPECTROLAB JrCCD. The final part describes possible fields of application of spectral analysis on metals and their alloys.

Keywords: ***Spectral analysis, chemical composition, metals and alloys, spectroscopic methods, spectrolab***

Definition spectral analysis

Spectral analysis is a method for determining or evaluating concentration or quantity of chemical component (element) of the material.

Atoms and molecules have unique spectra. These spectra can be interpreted to derive information about the atoms and molecules, and they can also be used to detect, identify or quantify specific chemical elements present in the material.

Spectroscopy is also used in astronomy. Most research telescopes have spectrographs. The measured spectra are used to determine the chemical composition and physical properties of astronomical objects (such as their temperature or velocity).

Classification of Spectroscopic Methods

Spectroscopy is a sufficiently broad field where many sub-disciplines exist, each with numerous implementations of specific spectroscopic techniques. The various implementations and techniques can be classified in several ways.

Different methods are suitable for different kinds of materials:

- solid, fluid, liquid state;
- organic or inorganic materials;
- metals, plastics, rubbers…

Spectroscopic method could be basically classified according to several criteria (see table 1) (Skoog, Holler & Crouch, 2006):

- type of radiative energy (x-ray, visible and ultraviolet, infrared spectroscopy...)
- nature of the interaction (absorption, emission spectroscopy...)
- type of material (atoms, molecules, crystals, nuclei)

Table 1

Type of radiation	Wawe length (cm^{-1})	Frequency (Hz)	Nature of the interaction
Gama (Y)	108 - 1010	$3{\cdot}10^{18}$ Hz - $3{\cdot}10^{20}$ Hz	Disintegration of atomic cores
Roentgen (RTG)	106 - 108	$3{\cdot}10^{16}$ Hz - $3{\cdot}10^{18}$ Hz	Ionization
Ultraviolet (UV)	104 - 106	$3{\cdot}10^{14}$ Hz - $3{\cdot}10^{16}$ Hz	Electron transition
Visible light (VIS)	100 - 104	$3{\cdot}10^{12}$ Hz - $3{\cdot}10^{14}$ Hz	Electron transition
Infrared (IR)	1 - 100	30 GHz - $3{\cdot}10^{12}$ Hz	Vibration of molecules
Microwave (MW)	0,01 - 1	300 MHz - 30 GHz	Roration of poleculôes
Radio waves (LW)	10-4 - 0,01	3 MHz - 300 MHz	Transition of core spins

Types of spectroscopy are distinguished by the type of radiative energy involved in the interaction. In many applications, the spectrum is determined by measuring changes in the intensity or frequency of this energy. The types of radiative energy include (Skoog, Holler & Crouch, 2006):

Electromagnetic radiation was the first source of energy used for spectroscopic studies. Techniques that employ electromagnetic radiation are typically classified by the wavelength region of the spectrum (table 1) and include

- Gamma spectroscopy;
- X-ray spectroscopy;
- visible and ultraviolet spectroscopy;
- infrared or near infrared spectroscopy;
- microwave spectroscopy.

Particles, due to their de Broglie wavelength, can also be a source of radiative energy and both electrons and neutrons are commonly used. For a particle, its kinetic energy determines its wavelength.

Acoustic spectroscopy involves radiated pressure waves.

Mechanical methods can be also employed to impart radiating energy, similar to acoustic waves, to solid materials (Skoog, Holler & Crouch, 2006).

Types of spectroscopy can also be distinguished by the nature of the interaction between the energy and the material. These interactions include:

Absorption occurs when energy from the radiative source is absorbed by the material. Absorption is often determined by measuring the fraction of energy transmitted through the material; absorption will decrease the transmitted portion.

Emission indicates that radiative energy is released by the material. A material's blackbody spectrum is a spontaneous emission spectrum determined by its temperature. Emission can also be induced by other sources of energy such as flames or sparks or electromagnetic radiation in the case of fluorescence.

Elastic scattering and reflection spectroscopy determine how incident radiation is reflected or scattered by a material. Crystallography employs the scattering of high energy radiation, such as x-rays and electrons, to examine the arrangement of atoms in proteins and solid crystals.

Impedance spectroscopy studies the ability of a medium to impede or slow the transmittance of energy. For optical applications, this is characterized by the index of refraction.

Inelastic scattering phenomena involve an exchange of energy between the radiation and the matter that shifts the wavelength of the scattered radiation. These include Raman and Compton scattering.

Coherent or resonance spectroscopy is a technique where the radiative energy couples two quantum states of the material in a coherent interaction that is sustained by the radiating field. The coherence can be disrupted by other interactions, such as particle collisions and energy transfer, and so often require high intensity radiation to be sustained. Nuclear magnetic resonance (NMR) spectroscopy is a widely used resonance method (Skoog, Holler & Crouch, 2006; Martin & Wiese, 2003).

Spectroscopic studies are designed so that the radiant energy interacts with specific types of matter (Atoms, Molecules, Crystals and Nuclei):

Atomic spectroscopy was the first application of spectroscopy developed. Atomic absorption spectroscopy (AAS) and atomic emission spectroscopy (AES) involve visible and ultraviolet light. Atoms of different elements have distinct spectra and therefore atomic spectroscopy allows for the identification and quantization of a sample's elemental composition. Modern implementations of atomic spectroscopy for studying visible and ultraviolet transitions include flame emission spectroscopy, inductively coupled plasma atomic emission spectroscopy, glow discharge spectroscopy, microwave induced plasma spectroscopy and spark or arc emission spectroscopy. Techniques for studying x-ray spectra include X-ray spectroscopy and X-ray fluorescence (XRF).

The combination of atoms into molecules leads to the creation of unique types of energetic states which could be studied by both infrared and Raman spectroscopy. Electronic excitations are studied using visible and ultraviolet spectroscopy as well as fluorescence spectroscopy.

The combination of atoms or molecules into crystals or other extended forms leads to the creation of additional energetic states. These states are targets for several spectroscopic methods.

Nuclei also have distinct energy states that are widely separated and lead to gamma ray spectra. Distinct nuclear spin states can have their energy separated by a magnetic field, and this allows for Nuclear Magnetic Resonance (NMR) spectroscopy.

Atomic emission spectroscopy and its principle

As was stated before, too many spectroscopic methods currently exist with multiple principles. Atomic Emission Spectroscopy (AES) is very suitable and a most used method for metal and alloys chemical composition analyses, therefore we focus on this method.

Atomic Emission Spectroscopy is a method of chemical analysis that uses the intensity of light emitted from plasma arc or spark at a particular wavelength to determine the quantity of an element in a sample.

The wavelength of the atomic spectral line gives the identity of the element while the intensity of the emitted light is proportional to the number of atoms of the element.

AES is suitable only for electric conductive metals only. Analysed sample is burned in plasma arc (or spark) between analysed sample and electrode in the device.

Physical principle of AES could be very easily explained with using the Bohr Atom Model (see figure 1). Electrons revolve around the nucleus with protons and neutrons. The trajectory of electrons motion is the circle. The electrons can only travel in certain orbits (called by Bohr as the "stationary orbits"). Electron emits (absorbs) 1 photon when jumping from one orbit to another.

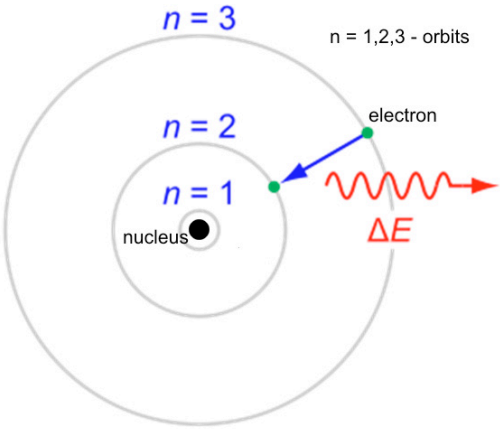

***Figure 1**: Bohr Atom Model*

The electron is in ground state and revolves on ground orbit (n=1) at the beginning. When the electron receives energy from excitation source (plasma arc, spark, flame) it jumps to the higher orbit (gets to the excited state, n=2). If the electron gets more energy, it jumps to higher orbits (n=3).

Excited state is unstable, therefore electron drops back to the ground orbit and emits a light energy (photon). Consequently, when electron drops from higher orbits, it emits more light energy.

Every chemical element has a specific number of electron revolving on specific number of orbits (according to Mendeleev's Periodic Table). The results from AES are then several wavelengths, characteristic for specific chemical elements present in a sample – the spectral lines. The analysed material is identified by those spectral lines.

Working Principle of AES Spectral Analyser

Atomic emission spectrometer works on a physical principle described above. The scheme in figure 2 describes how this principle is applied in practice.

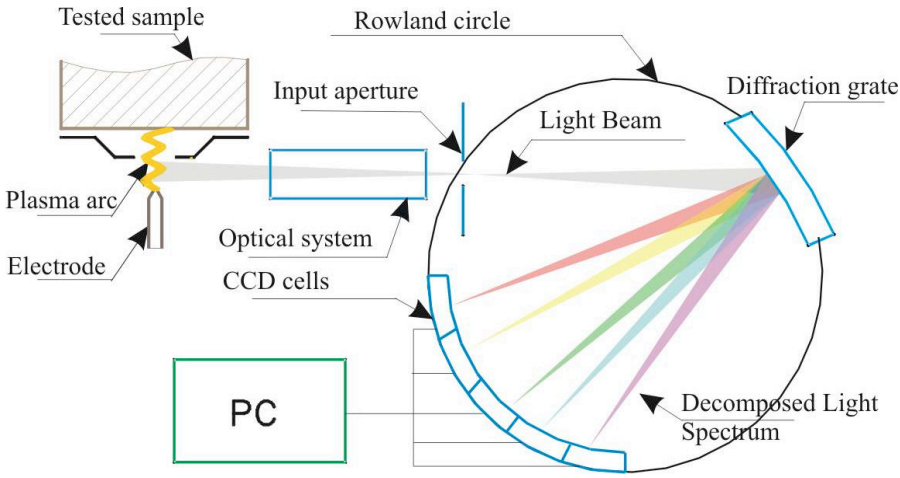

***Figure 2**: Working principle of AES Analyser (Mäsiar, Barényi, Cíbiková & Antalová, 2002)*

Plasma arc created by spark discharge starts firing between tested sample and electrode. The light of plasma arc is read by optic systems (there are separate optic systems for visible and ultraviolet light). The light goes through input aperture on diffraction grate where it is separated to its particular spectrum components (Mäsiar, Barényi, Cíbiková & Antalová, 2002).

Decomposed light is read by CCD elements that transform light signal (wave lengths) to the electrical one. CCD are commonly used in photo cameras, mobile phones etc. The electrical signal is read, stored and processed by computer. The values stored in computer are specific wave length (spectral lines) of the present chemical elements.

Computer calculates the result values of elements chemical concentration (in wt. %) from measured wave lengths by using complicated regression formulas.

The precision of regression calculation and consequently the quality of the whole analysis result are based on etalon measurement (it provides setting of some constant needed for regression=calibration). Etalon is an expensive sample with very precise homogeneous chemical composition.

Devices for atomic emission spectroscopy

Devices for AES could be classified according to their concept and precision to (see figure 3):

- laboratory spectrometers – They have bigger dimensions but are most precise;
- stationary spectrometers – smaller dimensions, good precision;
- mobile spectrometers – small and handy, but with average precision.

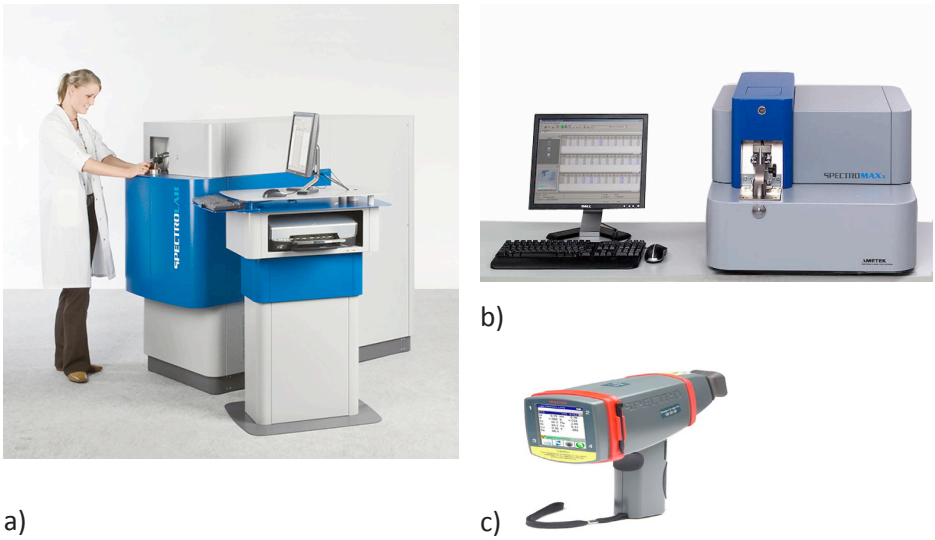

***Figure 3**: Types of spectrometers, a – Laboratory spectrometer, b – Stationary spectrometer, c – Mobile spectrometer (www.spectro.com, 2012)*

Presently, there are many producers of analyser. Most known companies are SPECTRO Analytical Instruments GmbH and Bruker Quantron GmbH. Both companies have their seats in Germany. Bruker Quantron is a division of American company Bruker AXS.

Fields of application of AES spectroscopy

Some examples of AES spectral analyser use are listed below:

- Quality control through check of chemical composition mainly in Casting or Foundry companies;
- Finding of the reason of component defect in production or durability – most probably caused by accidental material replacement or use of unsuitable material;
- Checking the possibilities or result of application of technological processing by technologies requiring some specific chemical composition of the material as are welding, casting, machining, heat or chemical heat treatment, etc.;
- Repairing or defect fixing of the component without available technical documentation or unknown chemical composition etc.;
- Detection of precise chemical composition of material for further study or research when content of chemical elements is input for computer simulation or calculation:
- and many other applications.

Conclusions

Spectral analysis is a powerful tool with usage in many industrial fields as well as in research. There are many spectral analysis methods and therefore many analysers of various principles are available. For the analysis of metal and its alloys AES method (mostly used in stationary analysers) is suitable as well as RTG method (mostly used in mobile analysers).

References

Skoog, D. A., Holler, F.J. & Crouch, S. R. (2006). *Principles of instrumental analysis*. Belmont: Thomson Brooks/Cole.

Martin, W. C. & Wiese, W. L. (2003). *Atomic spectroscopy*. National Institute of Standards and Technology. Retrieved on 14 March 2012 from http://www.nist.gov/publication-portal.cfm.

Mäsiar, H., Barényi, I., Cíbiková, & Antalová, D. (2002). Princíp činnosti a analytické možnosti spektrálneho analyzátora spectrolab JR CCD v ťažkých laboratóriách FŠT. In: TRANSFER 2002. Vyuzivanie novych poznatkov v strojarskej praxi. Zv. 2 Zbornik. Trenčín: FŠT TnUAD, 383-388.

Multimedia

Virtual production in television, how does it work?

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Abstract

The use of systems of virtual scenography, together with the use of other systems, such as video servers in which the tape disappears as a physical format, or the use of graphic engines in real time, has allowed us to optimise the work of the professionals. The Spanish television market has been exposed to a progressive process of fragmentation motivated by the gradual addition of autonomic and private televisions, the increase of the television offer by wire, satellite, DSL or Internet and the set up of the Terrestrial Digital Television with the multiplication of the offer of local, thematic and regional broadcasters. This process has led to a progressive increase of the offer that has reduced considerably the audience rates. The use of systems of virtual scenography, together with the utilisation of other digital technologies, such as video servers in which the tape disappears as physical format, or the use of graphic engines in real time is a tool that allows a better accommodation to this context.

Keywords: ***Television, virtual set, virtual reality, news-scenography***

1. Introduction

Stories are an integral part of our lives. Since our childhood we are exposed to stories in many different ways. Legends and stories about our culture and heritage are passed on from generation to generation. When our ancestors in the prehistory seated around the fire by the end of the day to tell stories, the most prestigious member of the group was in charge to tell the legends that were orally transmitted from parents to children. After several thousands of years when the author was a boy in the living room of my grandparents, in Vellisca, a small Spanish village in the region of La Mancha, my grandpa still told the stories around the fire. The fire was the centre of the living room, to the left there was a television (first in black and white and afterwards in colour) and to the right was the radio. In the living room of my parents, emigrated to a big city of the Spanish coast, the television had taken the place of the fire and was in the centre of the living room, and there was a radio to the right side. 30 years later, in my living room there is no longer a radio and of course neither a fire, just the television in the centre. So the television is nowadays the medium by which we transmit the stories, and the virtual scenography is a tool to help us to tell them (Gubern, 2000). In fact these techniques aren't new; from the beginning of the cinema, there already existed the need to set the background to be able to place the characters in a fictitious scenario that in sight of the viewer seemed real. With television we had the same needs of replacement of backgrounds, but now first takes part the chroma-key and later applies the technology that proceeds from the field of virtual reality.

2. Virtual set: What is?

Virtual reality is still a recent discipline and it has applied multiple definitions. The virtual set is a kind of application of virtual reality technology in television and it is also the result of the embedding between the camera signal and the computer generated virtual environment. The virtual scenario is updated in real time to adapt to changes in the camera signal. The result to the viewer is a uniform image. Finally, virtual studio is a technology which allows cameras to move, and whose audience is looking at the result of a mixture between real and virtual environment. To create the illusion that actors are inside a computer-generated set is necessary the real-time technique of camera tracking and computer graphics generated sets (see table 1).

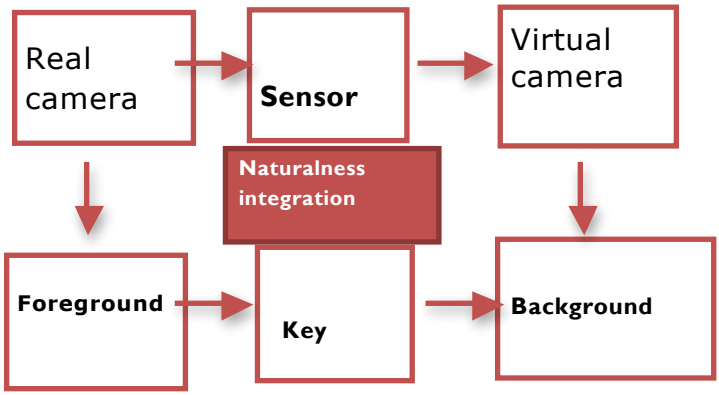

Table 1

3. Virtual studio broadcast

The use of virtual stages in television enters modifications in the work of staged in a television production (Galán, 2008). The space built in the studio, the physical disposal of elements that situate in front of the cameras no longer coincides with the space that appears in the narrative speech that arrives to the viewer. The studio has lost its hegemonic paper like the only source of the staged, and has turned into an element more than the process. The two new elements that share this leadership are: the process of integration and the virtual stage generated in real time. This loss of weight of the decorated physicist, in favour of digital processes of treatment of the information, changes the television production process in three stages: preproduction, production and postproduction (Galán, 2009). Theses changes introduce news in the technological, economic and creative work in television. This complexity that enters the use of virtual scenography demands a series of requests that Danny Popkin (1997) resumes in nine recommendations:

1. Work closely with set designers;
2. Plan all shots well in advance, do not try to make them up as you go along;
3. Involve the lighting director as early as possible;
4. Use mannequins etc. in the virtual set to calculate distances, heights and angles;
5. Make sure there is enough room for the lighting (leave a minimum space of 1.5 metres from the chroma key walls;
6. Establish key light directions and angles that can be reproduced in the studio;
7. Print out the positions of the camera, artists etc. on a studio floor plan;
8. Mark the floor as appropriate of each shot;
9. Be prepared for the process to take twice as long as you expect.

In definite, the work with a system of virtual scenography enters modifications in the process of television production contemplating three fundamental slopes: the technological slope, the creative and the economic.

Television production with virtual scenography is more complex than when dealing with a study of real scenography because the latter has only to manage the foreground, whereas the first has to carry out the process of integrating the foreground with the background to get the final composition (see table 2).

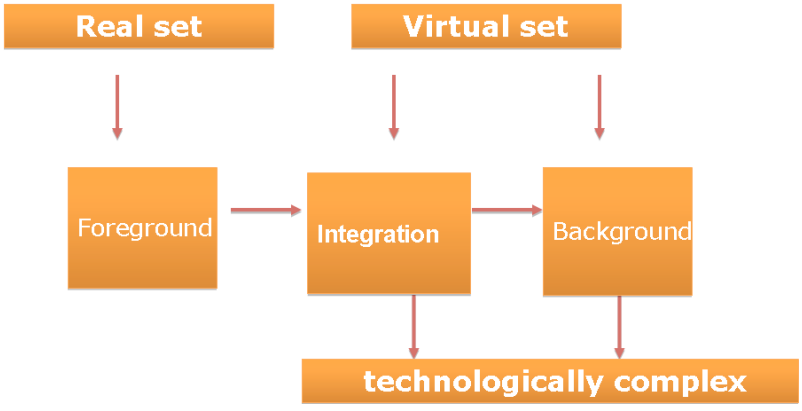

Table 2

The technological complexity introduces limitations on a creative level, for example: artistic staff direction, lighting and loss of improvisation. The problem is that we haven't explored the creative benefits because it has privileged the economic side (see table 3).

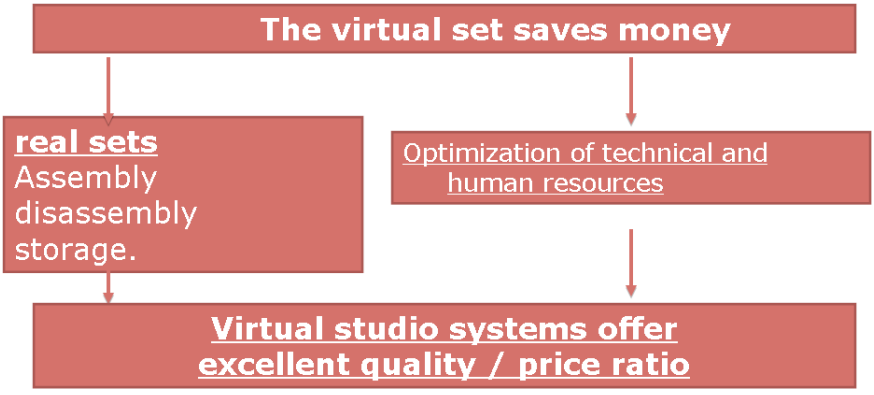

Table 3

Therefore, the birth and the evolution of the technology of the virtual scenography has been promoted especially by these three factors: the technological factor, the creative or artistic and the economic. In the beginning of virtual scenography, the

technological factor – digitalisation of the systems of production in television – and the creative factor set to win the limitations of the chroma-key, had a strong influence to win the limitations of the chroma-key. However, the element that stood out and resulted decisive and that has marked the evolution and the current nature of the virtual sets is the economic factor that configures like the main advantage that offers to the chains of television the use of a system of virtual scenography (Grau, Pullen & Thomas, 2004).

4. The virtual scenography and the television format

Since the virtual stage is fundamentally a wrapping in which things occur, of the three appearances that compose the script – contained, meaning and form – the one which is more affected by the use of virtual scenography is the form. When working with some virtual surroundings, the form is mainly affected in which the story is set. Although a priori the use of virtual scenography would not have to affect the contents of the programme, the loss of capacity of improvisation can suppose a strong problem to produce formats.

It cannot be affirmed that neither some genders nor a type of contents are apter than others to be working with virtual scenography. Any gender is perfectly viable to be developed in a study of virtual scenography, whenever there is a more or less fixed script. The application produced with a system of virtual scenography, will not become affected by a change of contents, as long as it does not carry any change in the diagram of the application previously configured. In a newscast, introducing the news of a popular party or of a terrorist attack, the information is presented in the same physical space, looking to the same camera and the only that changes –or has at least to do it –, is the gesture of the presenter and the image of the plasma that in occasions appears behind, and that is used to consist, in the majority of the cases, in the first image of the video that is being presented.

Therefore, inside the informative gender, the traditional newscast is a very apt format to be achieved with virtual scenography, due to the fact that in spite of that there is a lot of variability in the contents that follow, by definition, a very rigid diagram of direction and therefore, there is no margin to improvisation.

However, inside the informative gender there are other formats, as for example the debate. Due to the fact that the debates are programmes where the leadership has the word, there is need for the greatest visual dynamism possible, which avoids the boredom that these formats might cause in front of a big part of the audience. In a debate, the course of the interventions is unpredictable and all the previous planning end resulting useless.

In programmes which demand a very dynamic direction and that require a high level of improvisation – as it can be the case of the interviews, the debates or the talk-shows –, it is preferable to use real scenography due to the fact that there is not any type of technical limitation a priori (Hughes, 1996). In this type of programmes

it is very difficult – besides being boring – to work with an enclosed script. There are programmes where there is a script of contents that can vary according to the current affairs or of the planification of the programme.

On the other hand, in these formats the direction team of screenwriters are very accustomed to working with very open scripts. In occasions, even the introduction of changes in the order of the contents or modifications in the direction diagram, uses simply to keep all the team in tension, so that the degree of concentration in the work was greater.

Therefore, the adaptation of a programme to a virtual stage does not see hampered by the gender of the programme neither by the degree of alteration of the contents during the broadcast or recording of the programme. What hampers the production of a programme of television with virtual scenography is the need of variation during the planification of the programme of the direction diagram.

In a talk-show, when breaking news arrive, the changes mentioned involve dropping out the initial planning and a programme directed with virtual scenography would mean:

- change of decorated virtual;
- change of decorated physicist;
- change in the illumination;
- need to adjust the control of cameras;
- need to direct the integration;
- need to change –if possible– the position of the cameras and to check the scale;
- in the case in which the virtual stage has some type of interaction with the real part – usually the presenter –, there is the need to predict all the possibilities of interaction so that they do not go in conflict with the signal of camera and the virtual surroundings.

Therefore, there are too many steps to those who are in charge of this modification in the planning. Although its execution does not result unfeasible, it results quite costly and difficult. These steps in a programme directed with real scenography reduce considerably:

- change in the illumination;
- change in the adjust of the control of cameras;
- change in the position and the setting of the cameras.

Therefore, today, with the technical endowment which explains the studies of virtual scenography in our country, – number of cameras, size of the studio, sensors, needs of illumination and integration, etc. – it is more viable the direction of formats with high level of formal improvisation, with a real stage.

5. Conclusions

In regards to the technological level, the fundamental is the security and the reliability in the use of the graphic systems in real time. The platforms of 3D charts centre their efforts in creating more robust, reliable and intuitive surroundings of work for the user. The implementation of new creative solutions is, today, more fruitful than ten years ago and the state-of-the-art is well prepared to satisfy the real demand of the market. In addition, the success of the relationship between quality and production cost stimulates the exploration of the new possibilities that technology offers. Bearing in mind that these tendencies are a reality, it is fundamental to contemplate the incorporation to the labour market the new generations of professionals, more familiarised with the 3D design and the graphic engines in real time. These new professionals can achieve the implementation of systems that consolidate the process of fusion that already has initiated between the technologies of virtual scenography and real scenography, in the same study.

6. References

Galán, E. (2008). Escenografía virtual en TV. Análisis del uso de escenografía virtual en la realización de un programa de televisión. La Laguna (Tenerife): University of la Laguna. *Revista Latina de Comunicación Social*, 63, 31-42 retrieved September 12 from:
http://www.ull.es/publicaciones/latina/_2008/04/Galan_Cubillo.html
DOI: 10.4185/RLCS-63-2008-752-031-042 / CrossRef link

Galán, E. (2009). El trabajo del presentador de televisión en un escenario virtual (The work of the TV presenter in a virtual set). La Laguna (Tenerife): University of la Laguna. *Revista Latina de Comunicación Social*, 64, 143-150. Retrieved on 6 April 2009 from:
http://www.revistalatinacs.org/09/art/13_812_07_escenario/Esteban_Galan_Cubillo.html
DOI: 10.4185/RLCS-64-2009-812-143-150 / CrossRed link

Grau, O., Pullen, T. & Tomas, G. A. (2004). A combined studio production system for 3-D capturing of live action and immersive actor feedback. IEEE Transactions on Circuits and Systems for Video Technology.. Retrieved on 10 April 2010 from:
http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=1273546&abstractAccess=no&userType=inst

http://downloads.bbc.co.uk/rd/pubs/whp/whp-pdf-files/WHP102.pdf

Gubern, R. (2000). *El eros electrónico (The electronic eros)*. Madrid: Taurus.

Hughes, D. (1996). Virtual studio technology. The 1996 Eurovision Song Contest. London: *EBU Technical Review*. 268, 7-13. Retrieved on 10 April 2010 from http://tech.ebu.ch/docs/techreview/trev_268-hughes.pdf

Popkin, D. (1997). Virtual studios - the BBC's experience. London: *EBU Technical Review*: 272, 19-23. Retrieved on 10 April 2010 from http://tech.ebu.ch/webdav/site/tech/shared/techreview/trev_272-popkin.pdf

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Education

Nine months of winter, three of scorching hell[1] – Portuguese meteorological adages throughout the year

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Abstract

This paper intends to discuss the topic of fixed language from a linguistic standpoint, namely resorting to concepts of phraseology and paremiology. These will enable us to approach the problematic issue of word combinations, which are traditionally divided into free combinations and restricted combinations, and also consider their main characteristics, mainly lexicalisation, non-compositionality, syntactic irregularity (or frozenness) and semantic irregularity (or idiomaticity). The latter combinations comprise, for example, collocations, idiomatic expressions and proverbs, which account for the major output of human speakers – people speak in set phrases, as Mel'čuk (1998) upholds.

However, restricted word combinations are culturally-bound and, as such, should be understood within the history and culture that produced them. One such case concerns the use of meteorological adages in Portugal, an extremely productive collection of popular sayings which aim at summarising weather observation made by consecutive generations and concluding about their influence and effect on farming throughout the year.

Keywords: ***compositionality, idiomaticity, frozenness, meteorological adages.***

Introduction

The aim of this paper is to approach phraseology from a linguistic point of view. According to Jorge (2009, p. 120), phraseology is a hyperonym that encompasses numerous subsets of phrases or fixed structures that have either an idiomatic or a moralising value. Therefore, both the concept and the area of study of phraseology allow us to distinguish between free combinations, on the one hand, and restricted or set combinations, on the other.

Set combinations, set phrases or fixed expressions are some of the many terms attributed to this linguistic phenomenon that share several features, such as lexicalisation, non-compositionality, syntactic irregularity (or frozenness) and semantic irregularity (or idiomaticity). The fact that people mainly speak in set phrases, as Mel'čuk (1998) maintains make it a highly appealing subject of study.

The first part of this paper shall focus on the explanation of the principle of compositionality (or rather its absence in set phrases), the perspective on this issue of several authors, such as Zgusta (1971), Fernando (1996), Mel'čuk (1995, 1998) or Iriarte Sanromán (2001), and the characteristics that bind idiomatic expressions or full phrasemes, collocations or semi-phrasemes and proverbs or pragmathemes together in the same group.

However, set combinations are culturally-bound and must be understood within the history and culture that observed their creation. The particular case we chose to discuss refers to Portuguese meteorological adages, a remarkably productive collection of paremiological[2] data which have attempted to summarise weather observations made throughout numerous generations, ultimately enriching a nation's cultural heritage. The adages selected are concerned with the influence weather conditions pose upon farming and with advice about farming activities, especially those which include the names of the months of the year. These reflections shall occupy the second and third parts of the paper.

Word combinations: free combinations and set phrases

A feature that must be taken into account when discussing language, either figurative or literal, is the canon of compositionality, according to which the meaning of phrases and sentences result from the sum of their separate units. The global meaning of a linguistic expression is the result of the sum of the meanings of each of the elements that make up this same expression, thus its sense being compositional.

Contrary to this, figurative language is viewed as special, because of the impossibility of imposing a process of compositionality upon the words that make up their expressions. Proverbs and idioms are examples of a non-compositional meaning (Hoffman & Honeck, 1980, pp. 8-9).

As a means of demonstrating the unpredictability of any natural language, the German philosopher and logicist Frege (cit. Fromkin, 2000) mentioned that:

> It is astonishing what language can do. With a few syllables it can express an incalculable number of thoughts, so that even a thought grasped by a terrestrial being for the very first time can be put into a form of words which will be understood by someone to whom the thought is entirely new. This would be impossible, were we not able to distinguish parts in the thought corresponding to the parts of a sentence, so that the structure of the sentence serves as an image of the thought. (pp. 374-375)

According to Frege (cit. Fromkin 2000, p. 375), the understanding of a sentence takes place from the comprehension of its parts and their combination within the structure of a sentence, enabling to recognise the meaning of the familiar elements and the usual ways of combining them in sentences that have never been read or heard before.

Therefore, the principle of semantic compositionality consists of the process of progressive construction of meanings from the morpheme to the sentence itself and of the relationship that these meanings establish among themselves. However, this principle is not always respected in all linguistic constructions realised by speakers, as in the case of collocations, idiomatic expressions or proverbs, since their interpretation may not depend on the meaning of their parts. These expressions are hardly ever compositional, because their constituents are not real semantic elements, they are not relevant for the global meaning of the expression or their meaning cannot be inferred through a compositional process (Curse, 1999, p. 74).

Furthermore, Hudson (1999, pp. 273-276) presents another approach to compositionality, which encompasses linear compositionality, non-linear compositionality and non-compositionality. The first type of compositionality occurs in literal constructions, as stated above. The second refers to the cases in which the elements of the phrases are discontinuous, i.e. these are separated ones from the others by other words or phrases. An example would be: "O meu irmão, que foi para Eramus na semana passada, perguntou por ti" [My brother, who went on Erasmus last week, asked for you.], in which the relative pronoun violates the compositional meaning of the sentence, because it interferes in the information conveyed and prevents understanding. Finally, non-compositionality is typically represented by figurative expressions, whose meaning cannot be reached from the sum of the signifiers of their parts.

Vilela (1994, pp. 9-11) upholds that the lexical knowledge of a language implies not only the knowledge of morphemes, simple and compound words and their respective meanings, but also of a number of fixed or set phrases, which are non-compositional. Their importance derives from the fact that they are extremely common in any natural language and represent their wealth, paradoxically more

metaphorical and figurative than literal, surpassing what native speakers believe their languages to be.

Generally speaking, these expressions tend to reach a certain degree of frozenness or syntactic irregularity, not normally allowing other combinations and preventing the order of their parts from being changed. Additionally, they frequently break the combination rules derived from semantic proprieties, possessing syntactic and semantic features of their own. Therefore, they must be understood as whole units with specific meanings and restrictions to their occurrence. (Fromkin & Rodman, 1993, pp. 197-198)

These features will inevitably bring about problems of polysemy (as well as difficulties for learners of foreign languages), because the different meanings of a word will be dependent on the senses it acquires when combined with other words. Consider the following examples of the Portuguese figurative use of colours: "tapete vermelho" [red carpet], meaning to give someone a special treatment due to social status; "período negro" [black time], which means a time filled with difficulties; "fumo branco" [white smoke], which represents a moment for peace or when a decision has been made; "vida cor de rosa" [pink life] that denotes that someone has lived a perfect life, out of the real world. Some of the significances acquired by the colours are definitely culturally-bound, whereas others will be non-conventional uses that do not represent visual attributes, but rather random and arbitrary lexical associations (Freitas, Santos & Silva, 2011, p. 3).

Although the existence of a certain degree of frozenness in language is a common characteristic of phraseological expressions, it does not necessarily imply idiomaticity. In the words of Iriarte Sanromán (2001, p. 25), the more or less fixed expressions of a language are generally known as phrases and they correspond to specific sequences learnt by heart, lexicalised phrases or lexical combinatory patterns. This range of combinations is then understood by speakers as words, including everything in the spectrum from collocations to idiomatic expressions (idem, p. 28)

It is striking what Meľčuk (1998) upholds that "PEOPLE SPEAK IN SET PHRASES – rather than in separate words; hence the importance of set phrases" (p. 23), which is emphasised further by the fact that phrases in any language "outnumber words roughly ten to one" (p. 24).

Lexical combinatorics or lexical co-occurrence consists of the capacity for lexical units to combine themselves into phrases, i.e. syntactic and lexical expressions, and to convey a certain meaning, based on the principle of structuralist linguistics, according to which linguistic units never work as separate phenomena, but rather establish a relation of interdependence within a whole which is called a structure. This co-occurrence may be free or restricted: it is free when this combination is done following the grammatical rules of a language (free phrases), whereas it is restricted when the combination occurs with two or three lexemes in accordance

with semantic and syntactic rules and some kind of purely lexical restriction (set phrases or phrasemes) (Iriarte Sanromán, 2001, p. 117).

For Meľčuk (1995, p. 175), a free phrase can be replaced by another synonymic lexical expression and its signifier is understood out of the sum of all the signifiers. On the other hand, restricted lexical combinations can be divided into pragmatic phrasemes or pragmathemes and semantic phrasemes, the latter also encompassing full phrasemes or idiomatic expressions, semi-phrasemes or collocations and quasi-phrasemes, which we shall develop further below.

Zgusta (1971, pp. 142-151) also discusses the issue of restricted combinations, presenting a number of criteria for distinguishing them from free combinations: in the former phrases substitution is impossible, as well as the addition of other words in most cases; the meaning of the whole is non-compositional (not deriving from the meaning of the single constituent parts); a synonym or near-synonym may exist, consisting of only one word; a small group of expressions may be related and have an analogous status; a one-word equivalent in a foreign language may suggest that it is a multiword lexical word; and they may show special formal and grammatical properties, like the absence of articles. Nevertheless, even conforming to most of these criteria, there are still combinations of words that are not set phrases, because they do not perform the same syntactic and onomasiological function as a morphologically simple unit at both syntagmatic and paradigmatic levels.

From the standpoint of Zgusta (1971, pp. 154-155), the absence of articles is of crucial importance to distinguish between multiword lexical units (mostly idiomatic expressions) from other set groups of words, such as proverbs, sayings, quotations, and similar fossilised or petrified expressions. Moreover, there are different degrees of setness or of restrictions that can be extremely useful when comparing examples such as "caixa leve" [light box] or "jantar leve" [light supper], since, in the latter, the combinatory possibilities are more restricted, not to mention also metaphorical. Thus, the more severe the restrictions imposed on word combinations are, the more "set" (frozen or fossilised) these combinations are.

Returning to the concept of semantic phrasemes by Meľčuk (1995, p. 181), these are the combination of two or more lexemes, in which the overall meaning is different from the sum of their meanings, thus non-compositional. The meaning in a semantic phraseme is freely chosen, because it is not imposed by the situation, contrary to what occurs with pragmatic phrasemes. The lexical selection of their meaning is partially or totally limited, even if it may be a regular construction in morphological and syntactic terms.

Semantic phrasemes are subdivided into full phrasemes or idiomatic expressions, semi-phrasemes or collocations and quasi-phrasemes. According to Alonso Ramos (1993, p. 182), full phrasemes are characterised by a group of features: they are semantically non-compositional and coherent (their elements are mutually required); they resist formal variation; they can be ambiguous and bring about problems

when they are to be approached in light of linguistic models. The meaning of full phrasemes is represented as 'AB' = 'C', in accordance with Mel'čuk's terminology.

The meaning of semi-phrasemes or collocations, for Mel'čuk (1995, p. 46), does not match the sum of the meanings of their elements, which are not freely selected. Because of this, they are not free combinations of lexemes, but frequent, probable, preferential or usual combinations of lexemes (namely [noun + adjective] or [verb + noun]), as well as apparently free combinations created according to the rules of a language where some type of lexical restriction determined by these rules is to be found.

Nevertheless, frequency should be neither the only nor the most important criterion for the identification of collocations, others should also be considered. Examples of Portuguese collocations are as follows: "colocar/ pôr uma questão" [ask/ pose a question]; "dar/pedir desculpas" [provide an excuse/ apologise]; "ódio mortal" [blind hatred]; "apertar o casaco" [button up one's jacket] (Iriarte Sanromán, 2001, pp. 17-18). The meaning of collocations thus corresponds to the equation 'AB' = 'AC'.

The third type consists of quasi-phrasemes which preserve the meaning of the lexemes that make them up, plus an additional sense that is not deduced from the sum of their elements, thus creating a lexicalised whole in the same way idiomatic expressions do – e.g. "começar uma família" (start a family); "dar o peito" (give the breast). Their meaning amounts to the 'AB' = 'ABC' (Mel'čuk, 1995, p. 46).

Finally, pragmatic phrasemes or pragmathemes are structures in which "the choice of meaning is reduced to one possibility (or a few) and so is the choice of form" (Mel'čuk, 1995, p. 178), i.e. their meaning cannot be replaced by any other meaning. Their meaning is transparent and their form regular, but no equivalent or synonym can be used: "consumir de preferência antes de" [best before + date] for yoghurt cartons cannot be replaced by "*a ser consumido antes" [to be consumed before] or "*não usar depois de" [do not use after], because it is simply not the way it is used and it would not sound native or idiomatic.

Pragmatic phrasemes comprise sayings, proverbs and speech formulae. The most important type are routine formulae, also known as conversational formulae or those used to realise speech acts, which are viewed as units for habitual and stereotypical social interaction that accomplish specific functions in ritualised situations. These formulae include: discourse formulae, such as those for opening and closing conversations or for turn-taking; and psycho-social formulae that comprehend attitudinal-expressive, attitudinal-commissive, attitudinal-directive, assertive, ritual and miscellaneous formulae (Corpas Pastor, 1995, pp. 354-378)

Table 1 attempts to systematise the several types of phrasemes or set phrases, according to Mel'čuk's terminology.

Type of phraseme		Features
1. Pragmatic phrasemes or pragmathemes		• transparent meaning • regular and restricted form (one form or very few) • no equivalent or synonym, but paraphrase is possible
2. Semantic phrasemes	• Full phraseme or idiom	• semantic phraseme • semantically non-compositional • do not allow lexical variation • ambiguous
	• Semi-phraseme or collocation	• semantic phraseme • non-compositional meaning • not free combinations of lexemes • frequent, probable, preferential or usual combinations of lexemes
	• Quasi-phraseme	• semantic phraseme • compositional meaning • additional meaning deduced from the whole

***Table 1**: Mel'čk's classification of phrasemes.*

In conclusion, as shown above, most authors consider it complex to distinguish between the different levels of setness of frozenness, despite some degree of agreement on the following:

- set phrases break lexical combination rules;
- they have their own semantic and syntactic properties;
- they function as whole, complete units of meaning;
- and they present restrictions in their occurrence.

Apart from setness, there is another important feature that defines set phrases – idiomaticity. There are different levels of idiomaticity that are not considered as such by all groups of scholars, as the case of sayings, proverbs, phrasal and prepositional verbs, tournure idioms, binomials, frozen similes, ungrammatical, but generally accepted expressions, logical connective prepositional phrases, phrasal compounds, incorporating verb idioms, and formula expressions (Strässler, 1982, pp. 11, 15-16).

By approaching idioms from a pragmatic standpoint, Strässler (cit. Fernando, 1996) refers to the social implications of their use, which depends on a considerable number of social variables, such as social status, age, education and profession of their users. "When using an idiom, the speaker conveys more information than its semantic content (…) [establishing] a social hierarchy or [testing] the hearer's opinion in this matter" (p. 14), because s/he makes use of idioms in a deictic manner.

Their deictic use comprises first person idioms, second person idioms and third person idioms. The first and second person idioms are usually marked; they are the social deixis, because they allow for the establishment of social relationships – the first person idioms are used among people of the same social status, but avoided

by dominant speakers, and the second person idioms are only accepted among peers. Finally, the third person idioms are described as being non-marked and neutral and bear no restrictions to speakers of different social status. (Strässler cit. Fernando, 1996, pp. 14-15)

Therefore, idioms work as status markers and their use in conversation consists of a way of showing membership – this is another difference of idioms towards their literal counterparts, which don't convey this pragmatic role (Strässler cit. Fernando, 1996, pp. 14-15). The same occurs with pragmatic phrasemes, in which proverbs and sayings are included, since they perform a social function dependent on habitual and stereotypical interaction, as mentioned above.

In conclusion, the presentation of these several linguistic approaches to word combinations emphasise the complexity of this issue and the terminological inconsistency.

Nevertheless, the following features can be summed up:

- set phrases have at least two lexical independent elements;
- they bear a high degree of semantic opacity, i.e. they are non-compositional by nature;
- they are non-literal and often metaphorical and idiomatic, i.e. showing semantic irregularity;
- they enable the creation of mental images;
- they function as complete, unbreakable units;
- they are fixed, frozen or crystallised sequences, i.e. they bear syntactic irregularity;
- they are exocentric and demotivated constructions;
- they are institutionalised;
- they have a limited extension.

A note on proverbs, adages and similar expressions

According to Pinto (1999, pp. 160-161), common sense consists of an ordinary way of thinking that comprises a body of shared maxims and beliefs, which may be more relativist or more universalist, and is explicitly articulated with proverbs, dicta, maxims, allegories and fables. The beliefs they convey can incorporate guidelines for behaviour, causal generalisations, but most demonstrate such broad knowledge that they cannot guide specific situations.

Costa Alves (2006, p. 20) declares that proverbs are expressions that reveal the numerous synonyms a natural language possess and a means to postulate the ancient practice of synthesising centuries of phenomena and behaviour observations. These are stereotypical expressions that represent a certain moment in the history of a language, the so-called paremiological shared knowledge of a community that

turned into one of the basis for discursive reasoning, i.e. for argumentative purposes and the reaching of a conclusion (Anscombre, 1997, p. 46).

According to Funk & Funk (2009, p. 43), proverbs are typically made up of several words, building a full autonomous sentence as well as brief and context-independent. The fact that proverbs correspond to a sentence becomes one of the features that allow for the distinction between proverbs and idiomatic expressions, which do not share the same semantic and syntactic characteristics, even though they are both instances of fixed language. Following up on this issue, Anscombre (1997, p. 46) highlights that most proverbs are neither idiomatic (and thus not always metaphorical) nor fixed phrases, but rather encoded expressions that enable the identification of their function.

Nonetheless, Jorge (2009, pp. 120, 124) points out that both idiomatic expressions and proverbs share common features, namely lexicality, distributional restrictions, syntactic restrictions, non-compositional interpretation and anonymous nature. Lexicality is part of all structures that are comprised by the term 'expressions', but their degree of lexicalisation may vary from the semantic and syntactic standpoints. Similarly to idiomatic expressions, proverbs possess formal and textual components, as well as a strong degree of fixedness, prohibiting the moving, substitution or insertion of elements. Their expressive strength arises from the fact that it translates oral tradition of a community and holds its cultural heritage.

Apart from the word proverb, there are others worth mentioning, which are often thought of as synonymous, though several authors clearly distinguish among them. These are, for example, adage (which comes from the Latin "adagium", meaning to say or to speak), dictum, aphorism, refrain or saying that Anscombre (1997, p. 45) defines as being cases of autonomous expressions with no known author. On the one hand, proverbs are universal, because of being public and part of the heritage of the community, though more prestigious, whereas adages and refrains are popular for being typical of the elderly and villains. However, it is not our intention to discuss this issue in-depth, since it is not the focus of this paper. It shall be referred to whenever considered necessary.

Generally speaking, Costa Alves (2006, pp. 17-18) considers the bulk of these expressions attract much prejudice and contempt, based on the artificial dichotomy between popular knowledge and aureate knowledge, as if adages were to be restricted to pre-historical periods. However, the accuracy of the syntheses provided by centuries of observations and orally registered come out as the most elegant and beautiful words reflecting human actions. Batalha (cit. Costa Alves 2006, p. 20) emphasises this idea, referring to the fact that proverbs are classical sentences, sanctioned by use or antiquity and often gathered from religious and philosophical collections.

The first collections of Portuguese popular sayings were carried out by Fathers Bento Pereira and António Delicado in the 17th century, but invariably focused

on proverbs of national use, which meant that those of local or regional use were systematically neglected by missionary efforts. Until the 20th century, almanacs were of the utmost importance for the dissemination of proverbs. Although these almanacs were considered a minor genre, because they were a manifestation of oral literature, they expressed themselves in a non-traditional way, which was the written form, contributing to their lexicalisation. In terms of weather prediction, the "lunários" or "folhinhas de lua" (lunar calendars) maintained their ubiquitous presence until quite recently: "Homens fazem o almanaque e Deus manda o tempo" [men make the almanacs, God sends the weather] (Costa Alves 2006, p. 21).

Costa Alves (2006, pp. 22, 25) states that proverb collections are an open book of dozens of generations that introduced their remarks and experiences resulting from social change into these sayings, in the way Galileo upheld: by means of observation and deduction. In proverbs and adages, the metaphor of the weather is also the metaphor of history.

In the view of Peixoto (in Costa Alves, 2006, p. 12), proverbs are a manifestation of acculturation and of the observation of the real world and of human actions; they are a synthesis of the accumulation and sedimentation of intelligence, which was able to reflect upon the phenomenology of reality, by filtering its essence, and upon the attitudes of man, by enabling its characterisation.

For Peixoto (in Costa Alves, 2006, pp. 12-13), meteorological adages or dicta are a particular type of pragmatic phrase(me)s that humankind devised and gathered due to the inevitability of having to fight against weather conditions to survive. Man had to observe nature in a much more intense way than nowadays. The experiences and experiments they went through for centuries materialised into adages. With the advent of scientific positivism, meteorology developed into a science with the application of the laws of physics and chemistry to the natural system, as well as its mathematisation, and weather observations turned into measurements by means of advanced technological equipment. The wisdom contained in proverbs was thereafter logically and quantitatively justified.

According to Anscombre (1997, p. 45), meteorological adages are different from most sayings, because they do not represent a doctrine or a moral philosophy treaty; they teach a technique, know-how based on wide experience. They are dicta that comprise either weather observations, and thus enable weather prediction, or rules of action. Due to the fact that they are stereotypical and habitual expressions, they become maxims and provide objective and deductive rules to apply to social interaction and to which there are no alternatives.

Portuguese meteorological adages

The proverb in the title of this paper, "Nove meses de inverno e três de inferno"1 [nine months of winter, three of scorching hell], is representative of a climatic anomaly that occurred between 1550 and 1700 at the north hemispheric scale, named the

Little Ice Age. Various authors alternatively put forth the period from 1430 to 1850, defending that this ice age also spread to the rest of the planet. Evidence of this ice age is, for example, the Brueghel's paintings of frozen rivers in the harsh winter of 1564-1565 in Flanders, the fact that the Thames froze for eleven times during the 17th century, or that the Greenland was blocked for several summers, 1,000 years after it had been called the "green land" by the Vikings when another climatic anomaly was under way, the Little Climatic Optimum (Costa Alves, 2006, p. 32).

The effects of this little ice age should be investigated in inland Portugal, namely in mountainous regions such as Trás-os-Montes and Beira Interior, where long and harsh winters were documented, as well as scorching hot summers. The winters would have resulted from the many and long situations of blocking anticyclones (or blocking highs) in Central Europe, and the summers from frequent situations of instability in the circulation at the low levels of troposphere in the Peninsula. Therefore, it is believed that the Portuguese proverb was originated due to this phenomenon, as well as the Spanish equivalents "Castilla, ocho meses de invierno y catro de infierno" and "En Madrid, nueve meses de invierno y tres de infierno". There are also two other noteworthy adages related to this Little Ice Age, which is "Pelos Santos, neve pelos cantos" [At the Saints (1st November), snow in all corners] and "Pelo Santo André, neve nos pés" [At Saint Andrew (30th November), snow at your feet] (Costa Alves, p. 33).

These harsh winters were also accompanied by thick layers of frost, called "geada" in Portuguese, which started as early as September and continued up to May and of which farmers were terrified. This weather feature is still present in Trás-os-Montes and other regions in Portugal nowadays, being responsible for the destruction of many crops, which is shown by two other popular sayings: "Novembro à porta, geada na horta" [November at the door, frost in the vegetable garden] and "Frio de abril come renovos aos mil" [Cold in April eats seedlings at the thousands] (Costa Alves, p. 48).

According to Costa Alves (2006, pp. 49-50), it is striking the equivalence between snow and frost as far as popular sayings are concerned, since they appear interchangeably in several: "Inverno com nevão, ano de pão" [winter with snow, year with bread] or "Ano geado, pão dobrado" [frosted year, double the bread] or "Folga o trigo debaixo da neve como a ovelha debaixo da pele" [wheat rests under the snow as the sheep under their wool].

The above-mentioned adages are mainly related to weather prediction in view of agricultural works. They tend to summarise information gathered from previous generations, condensing what is to be known in terms of the protection of crops, what should and should not be done in specific periods of the year in terms of farming and what is to be expected in each of the months of the year, as shall be demonstrated below.3

Beginning with January, there are many combinations of February or March with the first month of the year; however, some adages have been found containing advice about January, such as the following "Bom ano de janeiro faz o ano galhofeiro" [a good year in January makes the year a walk in the park); "Água de janeiro traz azeite ao olival, vinho ao lagar e palha ao palheiro" [water in January brings olive oil to the olive grove, wine to the wine press and fodder to the barn]; "Chuva de janeiro, cada gota vale dinheiro" [rain in January, each drop is worth money]. But if no rain falls and the sun comes out, then popular wisdom foresees that a hot January will bring the devil in its womb – "Janeiro quente traz o diabo no ventre".

Concerning February, this month is considered as a crucial month for the success of the remaining year, plenty of agricultural and cattle-related tasks: "A decrua em fevereiro faz o dono cavalheiro" [ploughing in February makes the owner a gentleman]. Despite being the shortest month of the year, it is usually a stormy month – "Eu sou o mês dos temporais, destruo casas e rebento portais" [I am the month of storms, I destroy houses and blow up gateways] – and rain as well as snow should be expected and welcome – "Neve que em fevereiro cai das serras, poupa um carro de estrume às vossas terras" [snow that in February falls from the mountains will spare a cart of manure to your lands]; "Quando não chove em Fevereiro, nem bom prado, nem bom lameiro, nem bom corno de carneiro" [when it does not rain in February, neither good grassland/pasture, nor good wetland, nor good ram's horn]; "Ao fevereiro e ao rapaz perdoa-se tudo quanto faz, contanto que o fevereiro não seja secalhão e o rapaz ladrão" [one forgives everything to February and to the boy, as long as the former is not dry and the latter is not a thief].

February is also closely connected to January for they are the keys for a good or bad year – "Os bons dias de janeiro vêm-se a pagar em fevereiro" [the good days of January will be paid for in February] and "Se o inverno não faz o seu dever em janeiro, fa-lo-á em fevereiro" [If winter does not do its job in January, it will do so in February] – and if February does not perform what is expected, there is still the hopeful March – "Aí vem o meu irmão março que fará o que eu não faço" [there comes my brother March that shall do what I have not done] or "Lá vem o meu irmão março que não deixará ovelha sem farrapo, nem o pastor se for fraco" [there comes my brother March that shall not leave any sheep without a rag nor the shepherd weak].

This last brother of February's tends to be an unpredictable month and one of the keys for a good farming year. Costa Alves (2006, p. 83) states that it should not be taken seriously for it has many faces, it is simply "Março, marçagão", in which the second word is March, to which a nasal diphthong was added as a suffix, with the meaning of big. "Março, marçagão" thus means big March, and will be the basis for the rhymes in the following adages. There are many variants of this proverb, some of which we selected: "Em março, de manhã pinga a telha e à tarde sai a abelha" [in March, a drop from the roof during the morning and the bee comes out

in the afternoon]; "Março, marçagão, de manhã inverno, de tarde verão" [March, big March, in the morning winter, in the afternoon summer]; "Março, marçagão, de manhã cara de cão, ao meio dia cara de rainha, à tarde cara de fuinha e à noite corta como a foicinha" (Fernandes & Parafita, 2007), [March, big March, in the morning face like a dog, at noon the face of a queen, in the afternoon the face of a weasel and at night it cuts like a sickle]; "Março virado de rabo é pior que o diabo" [March with its bottom up is worse than the devil]. Also in March, farmers are supposed to work the fields, as shown in the proverb "Em março, espetam-se as rocas e sacham-se as hortas" [in March, put down the spindle and plough the vegetable gardens].

In April, the length of the days is longer than the nights and the average rainfall remains high especially in northern coastal Portugal, which accounts for the understanding that "Não há mês mais irritado do que abril zangado" [there is no angrier month than belligerent April], as well as the many variations of the proverb "Abril, águas mil" [April, a thousand waters], an example being "Abril, águas mil que caibam num barril ou coadas por um funil" [April, a thousand waters that fit a barrel or are sieved by a funnel]. For instance, in Oporto the average number of rainy days in April is 14, when compared to the ones in Algarve, which are only 6. This rainfall is precious for agriculture, because "Águas que no verão hão-de regar, em abril hão-de ficar" [water that in the summer will water in April have fallen]. Therefore, the piece of advice that states that "Sol de abril, abre a mão e deixa-o ir" [April's sun, open your hand and let it go]; otherwise, "Nódoa de abril não há mês que a tire" [stain in April there is no month that can take out], that is the harm done in April for lack of water no other month can prevent.

An interesting fact that Costa Alves (p. 86) mentions is that rain has began to be faced by urban people as a burden, especially that which falls in the spring, despite the saying that goes "Nunca passou por mau tempo a chuva de primavera" [spring rain has never understood as bad weather], because after all "Abril frio e molhado enche o celeiro e farta o gado" [cold and rainy April will fill up the barn and fed the cattle], "Abril chuvoso, maio ventoso, fazem o ano formoso" [rainy April and windy May make the year gay], "Abril e maio são as chaves de todo o ano" [April and May are the keys to the whole year] and also "Do pão te hei-de contar, que em abril não há-de estar nascido nem por semear" [let me give you a word about bread that shall not be born in April nor unsowed].

As stated above, May is yet another of the keys of the farming year, mainly because it brings rain and this enables the development of crops, especially grain: "Maio chuvoso torna o ano formoso" [rainy May makes the year gay]; "Maio faz o pão e agosto o milhão" [May makes the bread and August the corn fields]; "Maio frio, junho quente, bom pão, vinho valente" [cold May and hot June, good bread and strong wine]; Maio hortelão, muita palha e pouco pão [May with vegetables, much fodder and little bread].

In June, farmers should anticipate good weather and enough heat to develop their crops: "Junho quente, julho ardente" [hot June, boiling July] and "Quem em Junho não descansa, enche a bolsa e farta a pança" [those who do not rest in June shall fill up their purses and their bellies]. Rain is the worst that can happen in this month and adages clearly show it: "Água de S. João tira o vinho e não dá pão" [water in Saint John (23rd June) takes the wine away and yields no bread]; "Chuva em Junho, mordedura de víbora" [rain in June, snake's bite].

July is the month of hard work in terms of agriculture, because "Em julho tudo farás, só o teu verde não ceifarás" [in July you shall do everything, except reaping your grains].

Both August and September are expected to be hot months, according to the proverb "Corra o ano como for, haja em agosto e setembro calor" [be that as it may, let there be heat in August and September]. An interesting proverb worth mentioning is "Couves em agosto, tumba à porta" [cabbages in August, tomb at the door] or "Quem quer ver um homem morto, dê-lhe berças em agosto" [those who want to see a man dead give him cabbages in August], meaning that cabbages are not supposed to be harvested in August, because they are not good enough.

Regarding September, popular wisdom states that it is a scorching hot month, sometimes exceeding the temperature of June "Setembro ou seca as fontes, ou leva açudes e pontes" [September either dries the springs or takes the dykes and bridges away] and "Em setembro ardem os montes e secam as fontes" [In September, hills will burn and springs will dry up]. The heat in September often continues throughout the beginning of October, giving rise to the adages "Em agosto secam os montes, em setembro as fontes e em outubro seca tudo" [in August the hills dry up, in September the springs and in October everything withers] or "Agosto madura, setembro derruba e outubro seca tudo" [August ripens, September throws down and October dries everything]. However, September is a highly important month for farming chores: "Em setembro, planta, colhe e cava" [in September, sow, harvest and dig up], because "Setembro é o maio do outono" [September is the May of autumn].

When October arrives, sensibility is requested as shown in "Em outubro, não fies só lã; recolhe o teu milho e o teu feijão, senão de inverno tens a barriga em vão" [in October, do not only spin wool, gather your corn and your beans; otherwise, in winter your tummy will be empty] and in "Em outubro sê prudente; guarda pão, guarda semente" [in October, be prudent; save your bread and save your seed].

November experiences what is called in Portugal, Spain and France the summer of Saint Martin, although in the case of the British this phenomenon occurs around the 18th October, known as St Luke's Little Summer. Therefore, "Novembro é quente no começo e frio no fim" [November is hot at the beginning and cold at the end] and "No dia de S. Martinho, lume, castanhas e vinho" [on Saint Martin's Day, bonfires, chestnuts and wine].

Costa Alves (pp. 94-95) refers that the meteorological explanation for this late summer is the temporary migration of the Azores High in the direction of the northeast of the Peninsula and part of France, thus establishing a block to the circulation from the west. Due to this similarity of weather conditions, some French and Spanish adages should be also mentioned: "À la Toussaint commence l'été de la Saint-Martin"; "Pour la Saint-Martin, tue ton porc et gôute ton vin"; "Por San Martino, el invierno viene de camino; si le dicen detente, llega por San Clemente; y aunque venga retrasado, por San Andrés ya ha llegado". In spite of this hot spell, November is portrayed as indispensable for later farming success: "Cava fundo em novembro para plantares em janeiro" [Dig deep in November to sow in January].

The last month of the year is for farmers to rest, so as to recover strengths for what is to come after the beginning of the new year: «Em dezembro descansa, em janeiro trabalha" [in December rest, in January work]; "Dezembro diz: olha que o governo está na boca do saco; até Janeiro, qualquer burro passa o regueiro mas para a frente tem de ser forte e valente. Se não tens governo, depois arreganhas o dente" [December says: beware that make do is at the mouth of the bag; until January any donkey passes by the trench, but after that one has to be strong and brave; if you have make do, then you shall grin your teeth].

With a view to summarising the main tasks for each month of the year, one last proverb will be presented: "Janeiro gear, fevereiro chover, março encanar, abril espigar, maio engrandecer, junho aceifar, julho debulhar, agosto engravelar, setembro vindimar, outubro revolver, novembro semear, dezembro nasceu Deus para nos salvar" [January frosting, February raining, March channelling, April growing, May developing, June reaping, July threshing, August storing, September harvesting the grapes, October ploughing, November sowing, December God was born to save us].

Conclusion

The presentation of a selection of Portuguese meteorological adages, which function as guidelines for farming activities developed throughout the year, allowed us to present not only the main characteristics that are common to various instances of fixed language, but also demonstrate how important these shared maxims and beliefs become for the cultural heritage of a community, despite the traditional prejudice towards oral traditions.

Paremiological knowledge includes proverbs, adages, dicta, refrains, sayings and the like that share with other set phrases a group of features, namely lexicalisation, non-compositionality, frozenness and often idiomaticity, and an autonomous nature. Based on Mel'uk's classification, idiomatic expressions or collocations are examples of semantic phrasemes, whose meaning is freely-chosen, and proverbs and adages are pragmatic phrasemes, because their meaning is demanded by the particular communicative situation. Despite various (often) contradictory approaches to these multiword lexical units, we uphold that these instances of fixed language are part

of the same group and have varying degrees of frozenness and idiomaticity: ones being more idiomatic, whereas others are more literal; and some are characterised by the existence of variants, while others do not allow any variation.

Furthermore, the set expressions we focused on throughout this paper are part of a group of sayings used in habitual stereotypical social interaction, which can encompass guidelines for behaviour (be it religious or philosophical) or causal generalisations, enabling discursive reasoning. On the one hand, proverbs are said to be more public and universal and also more prestigious, whereas, on the other, adages and refrains are believed to be more popular and subject to a less wide use by the several groups of a community. This distinction is important for the group of classical sentences we chose to approach, since meteorological adages are typical of rural contexts and are especially used among older people. These adages are the result of centuries of weather observation and subsequent deductions that were summarised and condensed in the shape of maxims. Their purpose was to fight adverse weather conditions and thus enable communities to survive by teaching them how to interpret the weather and adapt agriculture accordingly, as well as teach future generations the necessary farming techniques. With a view to disseminating this knowledge, almanacs and lunar calendar broke the chains of traditional oral transmission and adopted the written form, allowing for this knowledge to disseminate among communities.

Endnotes

1) All Portuguese adages will be literally translated into English.
2) "Paremia" is the Greek word for the Latin "proverbium", thus having led to the creation of the name paremiology to mean the study of proverbs and paremiography to refer to the collecting of proverbs.
3) From this point onwards, all adages presented were taken from Costa Alves (2006), as well as and their explanations, unless stated.

References

Alonso Ramos, Margarita. (1989). Aproximación a um nuevo modelo lexicográfico: el Dictionnaire explicatif et combinatoire du français contemporain. Recherches lexico-sémantiques de I. Melčuk. In Verba – *Anuario Galego de Filoloxía*, 16, 421-450.

Alves, Manuel Costa. (2006). *Mudam-se os ventos, mudam-se os tempos*. Lisboa: Gradiva.

Anscombre, Jean-Claude. (1997). Reflexiones críticas sobre la naturaleza y el funcionamiento de las paremias. *In Paremia*, 6, 43-54.

Corpas Pastor, Gloria. (1995). *Un estudio paralelo de los sistemas fraseológicos del inglés y del español*. (Doctorate thesis at the Universidad Complutense de Madrid). Málaga: Secretariado de Publicaciones de la Universidad de Málaga.

Curse, Alan. (1999). *Meaning in Language: an Introduction to Semantics and Pragmatics*. Oxford: Oxford University Press.

Fernandes, Isaura & Alexandre Parafita. (2007). *Os provérbios e a cultura popular*. Lisboa: Gailivro.

Fernando, Chitra. (1996). *Idioms and Idiomaticity*. Oxford: Oxford University Press.

Freitas, Cláudia, Santos, Diana & Silva, Rosário. (2011). *Corpos e cores: colorindo a descrição da língua portuguesa*. Text from the presentation at ICAME2011, Oslo, 2nd June 2011. Retrieved March 21 2013 from http://www.linguateca.pt/Diana/download/Freitas_Santos_Silva_ELC2011.pdf.

Fromkin, Victoria (ed.). (2000). *Linguistics – An Introduction to Linguistics Theory*. Oxford: Blackwell Publishers.

Fromkin, Victoria & Rodman, Robert. (1993). *Introdução à Linguagem*. Coimbra: Almedina.

Funk, Gabriela & Funk, Matthias. (2009). Dicionário Prático de Provérbios Portugueses: objectivos e metodologia. *In Paremia*, 18, 43-51.

Honeck, Richard & Robert Hoffman (Eds.) (1980). *Cognition and Figurative Language*. USA: Lawrence Erlbaum Associates.

Hudson, Grover. (1999). *Essential Introductory Linguistics*. Oxford: Blackwell Publishers.

Iriarte Sanromán, Álvaro. (2001). *A Unidade Lexicográfica: Palavras, Colocações, Frasemas, Pragmatemas*. Braga: Universidade do Minho and Centro de Estudos Humanísticos.

Jorge, Guilhermina. (2005). Periplo pola fraseoloxía portuguesa: *abordaxe lexicográfica*. In *Cadernos de Fraseoloxía Galega*, 7, 119-133.

Melčuk, Igor. (1995). Phrasemes in Language and Phraseology in Linguistics In Everaert, M. et al. (Ed.). *Idioms: Structural and Psychological Perspectives*. Hillsdale: Lawrence Erlbaum Associates, 167-232.

Melčuk, Igor. (1998). Collocations and Lexical Functions In Cowie, A. P. (Ed.) *Phraseology. Theory, Analysis and Applications*. Oxford: Clarendon Press, 23-53.

Pinto, Amâncio da Costa. (1999). O que é que a psicologia científica tem que a psicologia popular e o senso comum não têm? In *Psicologia, Educação e Cultura*, III(1), 157-17.

Strässler, Jürg. (1982). *Idioms in English – a Pragmatic Analysis*. Tübingen: Gunter Narr.

Vilela, Mário. (1994). *Estudos de Lexicologia do Português*. Coimbra: Almedina.

Zgusta, Ladislav et al. (1971). *Manual of Lexicography*. The Hague: Mouton de Gruyter.

Some Results of Cyber Space Economics in Education

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Abstract:

In this contribution we introduce Cyber Space Economics and its knowledge for such an important area as education or even training of citizens as it is in the case of public services for increasing level of e-government. Via the subjects focused also on education technology we educate our students to learn how to manage modern business supported by means typical for Cyber Space, or even how to create adequate education of citizens for avoiding mistakes in applications of technologies which might have negative consequences in modern society. So we are supposed to combine education with proposals and projects. Currently Internet applications provide a number of opportunities for education, communication and business. However, the options that are currently available for business operators are not only of a positive nature, since the networking brings quite a few opportunities for successful implementation of procedures also for example for tax evasion.

Keywords: ***Cyber space economics, BAO – business analysis on line, e-government public services, ICT information and communication technologies.***

Introduction

Technological progress in the field of ICT allows deploying information technology to businesses, organizations, businesses and of course, to the educational institution as a standard support tool. Such tool is critical even in the area of e-government services that are moving forward quality standards of public services. On the one hand, Information technology makes it possible to build modern educational environment, and is one of the tools by which educational institutions, enterprises, companies and organisations are gaining a competitive advantage. On the other, the operation of these information technologies requires resources and thus the more effectively these resources are employed the greater the contribution of information technology to the success of educational institutions, enterprises, companies and organizations, but also to the households is. In the framework of the investigation of modern communication technologies for delivering knowledge at our University in Trencin we are trying to equip our faculties according to the results of our research as well as research of other appropriate institutions.

Our survey in area of education technology

This follows on from the project VEGA. Among the first are the subjects of the lectures from the spatial economy but especially cyber space economics applied first of all in case of public administration implemented with the use of podcasting. It allows us to verify CLIL method on the integration of teaching content with professional English and its terminology, but also introducing the positions of the facilitator. On the part of students, we promote the study lectures in a very effective form of supported format mp3. Mobile systems will no doubt significantly affect the area of education. Of course, it cannot be expected to fully replace the electronic teaching, as we know it today in its entirety and from day to day. Not a very realistic idea or picture of someone who likes studying the extensive materials by hyperlinks linked materials on the small screen of mobile device as MP4 player or iPod. In some subjects the study lectures supported by MP3 are considered prospective as they are a very effective form of study or m-learning with mobile devices. For testing the players even with multimedia designation we focused on player MP4 brand CANYON which, like other available player, has insufficient performance or the quality and usefulness for the study were not perfectly adequate. For such purposes each would rather prefer to study via a classical personal computer with a large-screen or even multimedia hub TV set. But in certain situations, we will use mobile devices definitely at least as a snappy supplement. Since we would like to know more accurately about the preferences of the students after five years of study focused on education management and therefore be able to predict better what forms we need to prioritize, we did a survey among them. Results of the survey are in the table that follows.

	Face to face	Videoconference	E-mail	M-learning
Social politics	43%	27%	22%	8%
Education institutions	11%	29%	48%	12%
sustainable development	18%	12%	43%	27%
Financial accounting	31%	4%	46%	19%
Managerial accounting	12%	78%	7%	3%

***Table 1**: Relations between preferred forms of study and subjects of study program*
***Source**: own computation based on survey*

Thanks to one of the most important phenomenon - Internet - our world becomes one big globalised community. Currently Internet applications provide a number of opportunities for education, communication and business, see also Kvasnica, P., Várkoly, L., Kvasnica, I., (2004). However, the options that are currently available for business operators are not only of a positive nature, since the internet brings quite a few opportunities not only for cyber crime but also for ordinary not appropriate behavior of users. Prevention of such cyber crime is decisive nowadays since new development can be expected as shifting from the extensive collection based on tax declarations to intensive collection, based on sophisticated monitoring methods. But in case of our subject – Cyber Space Economics - we educate our students also how to manage modern business supported by means typical for Cyber Space. The most attractive part of Cyber Space Economics for students from abroad used to be final projects based on BAO – business analysis on line starting with analysis focused on web pages of almost two hundreds ski resorts of the Slovak Republic. Michalko, J., Klus, M., Adamkovičová, B., (2011). After completing their BAO they have the chance to control their results with real conditions offered by chosen ski resorts of the Slovak Republic.

Since the Erasmus team with five members from Portugal, two from Lithuania, two from Spain and one from Bulgaria received a special diploma of the University rector we would like to use good experience for suggesting some proposals for their regions. Support and development of new winter sport centers would probably bring synergy for regions not only in case of Lithuania and Bulgaria but also in Spain and Portugal. For example in the area of northern Spain and Portugal our proposals were focused on green energy and renewable resources as in the case of the region Galicia, for example, is wind energy which under influence of Atlantic Ocean seems as the most perspective source of energy for introducing the strategy based on organizing green clusters in such regions not only in Spain and Portugal territory

but in whole Europe means hope for sustainable development. If we combine such green energy with sufficient water springs for producing artificial snow it means ideal conditions to organize appropriate season for winter sports. Positive side effects of artificial snow producing connected with retaining of fresh water in the mountains is considered as a decisive measure with strategically important meaning, since nowadays we define fresh water as a strategically important material. But nowadays some regions not only in Spain and Portugal territory need sustainable water strategy but especially in the countries which have the chance even to find solutions also for improving employment for the young generation. By using our experience with students from these countries we would recommend to prepare projects for organizing green clusters also for other chosen regions not only in the area of northern Spain and Portugal but also in other parts of EU. Our proposals have been designed also for supporting the implementation of the Digital Agenda for EU based on Cloud from Strategy for Europe presented at Congress Itapa by Carl-Christian Buhr (2012). Cloud enables government and regional leaders to better deliver their key priorities such as Fiscal responsibility even in times of tight budgets; cloud can help governments to achieve necessary spending cuts without cutting into essential services. Better serve citizens as cloud can help make governments more responsive to the needs of its citizens even by increasing collaboration and coordination between departments. Lower emissions are achievable via new cloud facilities since they are less power-hungry than existing IT infrastructure and require fewer servers to generate the same output by running them more efficient. Therefore, cloud strategy is perfectly adequate for our concept of green clusters.

Using this strategy for the education of foreign students as part of cyber space economics gave us the chance to prepare students for a new sustainable era after the crises period of Europe 2020 Flagship Initiatives 'Innovation Union', 'Youth On the Move' and 'An Agenda for new skills and jobs', and in particular to bring education, research and innovation closer to each other to attract, train and retain in Europe the next generation of researchers who will be able to address major societal challenges. To meet these challenges we used to use Regional innovation strategies-RIS for appropriate preparation of our students to work not only in their home regions but also in other regions of Europe (Habánik, J., Koišová, E. 2011). Such education is perfectly adequate for the development of new skills of our students especially in the case of international groups with some cross cultural synergy effects. By the end of this school year we shall have been using such educational procedures for ten years at our faculty.

Education in support of services for e-Government

In order to prepare education of citizens even in retirement age and avoid some negative impacts recognized during our stay in Finland, we were using different forms of research at the Department on education technologies. Even our survey

based on comparison of chosen subjects for training in the school of management was part of the research. In form of table we present data according to the selected subjects, (see table 1), which gave us some knowledge in the area of educational effectiveness. As economists, however, we cannot ignore economic efficiency of technological substitution. We focused special attention on its efficiency in the article: Economic effectiveness of substitution in area of educational technology within the XII (Didmattech, Michalko, 1999). In this context, we would definitely have to talk also about the technological efficiency, especially in relation to the suitability of the individual educational technologies, considering the age, which affect technical skills. Considering the need for support research in this respect, we would like to illustrate with two examples from Finland, which is known for their technological progress. As participant of the Socrates program, over there ensuring the whole IP teaching in PC-lab without a limited connection to the Internet has led to a reduction of student's attention. Finland is also known for their technological progress in the area of e-Government. E-Government in the Scandinavian country holds is therefore, once again the key strengths of progress at least in terms of covered public services. Experts from Finland were always ready to make jokes of themselves, when considering this Scandinavian country as a country with the best hidden services in the field of e-Government, hidden for the inhabitants with irony referred to the low level of citizens education. Maybe that makes me a bit sad in the case of connecting the statement of our colleagues from Faculty of Social Sciences. We would recommend to research exactly if technological impact have some relation with sad finding about relatively high number of suicides among old citizens. But not appropriately organized education among citizens in retirement age without perfect knowledge of options could have some impact on satisfaction or frustration. Such improperly conducted education among citizens in retirement age can lead to their belief about the inability to cope with the developments of new technologies and to believe in their inability to participate in such web-based society. We used to analyze with our students a range of positive and negative experiences based on research from England or California, so we led them to transfer best practices from abroad to Slovakia but with support of public media as it was recommended by Michalko, Jr., Bilčíková, N., Kneppo, I., Michalko, J. (2011).

Conclusion

Cyber Space Economics and its knowledge gave us chances for research in such an important area as education or even training of citizens as it is in the case of public services for increasing level of e-government that follows up on delivering the project focusing on education in the context of the Slovak national scientific grant agency VEGA. Such research in the field of education of the population helps us to find reserves which are sometimes inadequate even in developed countries as the shortcomings in the field of technological application may lead to negative

phenomena in society. Our experience will support the initiative notably through the EURAXESS activities that aim at removing obstacles to researchers' mobility and cross border co-operation.

Such cross border co-operation is also important for progressive regional development including businesses like SMEs and we consider this type of co-operation also as a chance to find solutions for improving employment of young generation and help to support jobs creation for more than 5 thousand citizens up to the age of 25 which represents one of the decisive problem of EU.

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References

Adamkovičová, B. & Michalko, J. (2012). *Changes to legal forms of business in agriculture*. In Almanach FSEV, FSEV TnUAD v Trenčíne, Trenčín, (in press).

Bilčík, B., Rohlová, K. & Macuchová, K. (2006). *Knowledge and experience from international virtual postgraduate study program*. In XIX DIDMATTEC. Komárno: J. Selye University.

Buhr, Carl-Christian (2012). The Digital Agenda for Europe, a policy vision, overview of progress. The European Cloud Computing Strategy. In Kongres ITAPA 2012: Zaostrené na výsledky. Bratislava: ITAPA.

Habánik, J. & Koišová, E. (2011). *Regionálna ekonomika a politika*. Bratislava: [s.n.]

Kutik, J. (2006). *Organizácia a krížový manažment verejnej správy*. 1. vydanie. Trenčín: FSEV, TnU AD.

Kvasnica, P., Várkoly, Ladislav & Kvasnica, Igor (2004). *e-Learning in case of chosen subjects at University of A. Dubček in Trenčín*, Zborník e-learn Žilina. Žiline: [s.n.].

Michalko J. (1999). Economic effectiveness of substitution in area of educational technology. In XII DIDMATTECH´99: *Zborník z medzinárodnej vedeckej konferencie*.

Michalko, Jr., Bilčíková, N., Kneppo, I. & Michalko, J. (2011). *Podpora vedy v mediach*. In: Zborník z medzinárodnej vedeckej konferencie Megatrendy a media. Smolenice: Faculty of Mass Media Communication, 263-271.

Michalko, J., Klus, M. & Adamkovičová, B. (2011). *Skúseností a možností rozvoja medzinárodnej spolupráce univerzít*, In Lingua Summit 2011: Problémy vzdelávania v kontexte súčasnoti. Trenčín: TnUAD.

Nitus, J. (1987). *God's Revolution His Revelations*. Orange: Twintree Publishers.

Várkoly, L. (2001). *Modern information technologies support process of teaching and research on universities*. Częstochowa: Prace Wydziału Zarządzania Politechniki Częstochowskiej. Technologie informacji. 2, 99-111.

Várkoly, L., Várkolyová, B., Barényi, I. & Kvasnica, P. (2005). Multimediálne prostriedky na podporu technického vzdelávania. In *XVIII DIDMAT TECH´05: medzinárodná vedecko-odborná*. [sl.: s.n.].

Vojtovič, S. (2006). *Personálny manažment. Historické súvislosti vzniku a rozvoja*. Bratislava: IRIS.

Vojtovič, S. & Krajňáková, E. (2006). O suštini, nove ekonomike. *Anali ekonomskog fakulteta u Subotici*. 16, 13-22.

Religion and cognition

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Abstract

This article elaborates the basic conceptions of the cognitive science of religion. The cognitive science of religion is a new interdisciplinary and naturalistic approach to religious phenomena. It focuses upon cognitive mechanisms of the human mind which underlie religious thought and behaviour as well as on evolutionary background of religious activity. This approach to religion aims at explanation and interpretation of religious phenomena from the perspective of cognitive science. Among the cognitive conceptions of religion, the following are of fundamental importance: (1) the naturalness of religion thesis; (2) the principle of "minimal counter-intuitiveness" of religious ideas; (3) the principle of "theological correctness"; (4) the conception of religion as a kind of anthropomorphism; and (5) the conception of religion as an evolutionary by-product of ordinary cognition.

Keywords: ***religion, cognition, religious ideas, anthropomorphism.***

Introduction

Contrary to predictions made by many scholars, religion is not likely to decline. Classical theories of secularization widespread among the 20th century scholars of religion now become increasingly problematic since the predicted decline of religion did not occur. Rather, it turned out that what was called secularization was not so much decline as the transformation of religiosity. Moreover, it has become clear that modernization does not necessarily entail secularization understood as a decline of religiosity. On the other hand, anthropologists and historians of religions point out that religion is almost universal. Religious phenomena can be found in all human cultures (Rappaport, 1971, p. 23). A vast majority of people in the world declare themselves to be religious. Against the background of the world population, secularized European countries constitute an exception rather than the rule. Why religious phenomena are ubiquitous? Why is religion almost universal in human cultures? What is the origin of religious ideas and practices? All these questions are addressed by the cognitive science of religion.

In the course of human intellectual history, there have been a number of attempts to understand and explain religion. These attempts have had religious, philosophical as well as scientific character. Although reflection on religion is very old and dates back to the beginning of Western culture, the scientific study of religion is relatively new. Most scientific approaches to religion had their beginning in the last century. Even today the scientific study of religion is accompanied by religious (theological) interpretations of religious phenomena that not always comply with the standards of modern sciences. However, the problem with studying religion is not only a methodological problem since for millions of people in the world religion is still a matter of deep personal commitment. A great number of people interpret the religious picture of the world as real and ultimate. They act, or at least try to act, in accordance with religious moral rules and ritual calendars. Some of them have specific religious and spiritual experiences that are connected to emotional responses. As a result of this subjective and personal dimension, religion cannot be studied merely from outside. On the other hand, religious studies cannot be purely subjective, exclusively based on personal faith since such an attitude breaks the rules of scientific investigation.

The scientific study of religion is not interested in the truthfulness of any historic religion or in the truth value of particular religious beliefs. The latter issues are explored within religious traditions. It is rather interested in origin, structure and functions of religious thought and behaviour. The results of the scientific study of religion do not depend on whether some particular religious beliefs are true or not. All these questions concerning the truthfulness of religion are 'bracketed' or suspended. In other words, the scientific study of religion is based on methodological agnosticism, i.e., the view that one should study religion as if one had no knowledge about the existence of gods. (Cf. Smart, 1973, p. 54)

The cognitive science of religion is a relatively new interdisciplinary approach to the study of religion that constitutes a part of the contemporary scientific study of religion. It is based on the achievements of cognitive sciences which itself is an interdisciplinary endeavour. Cognitive science includes such disciplines as psychology, neuroscience, logic, artificial intelligence, anthropology, and philosophy. According to cognitive scientists, mind can be understood as a representational-computational device, and studied in terms of mental representations and computational procedures that operate on those representations (Cf. Thagard, 2005, p. 10). In last several decades, there have been many attempts to apply the achievements of cognitive sciences to the study of society and culture. As a domain of culture, religion has become an important subject of investigation conducted by cognitive scientists.

Cognitive science of religion and the classical approaches to the study of religion

As it was already said, the cognitive theories of religion start from the position of methodological agnosticism (naturalism), which is at odds with both theological interpretations of religion and many classical approaches to the study of religion. The latter had a tendency to describe religion from an epistemic, not cognitive, point of view (Boyer, 1994). To study religious ideas from the epistemic perspective is to study them in their relation to the world and to present them as components of our knowledge of the world. One who studies ideas from the epistemic point of view is interested in their truthfulness. On the contrary, to study ideas from the cognitive perspective is to study processes, which make people believe in these and not other ideas, and ignore questions whether they represent the world.

Cognitive scholars of religion claim that there is nothing special in religion in respect of its cognitive functioning. Religious behaviour is based on ordinary cognitive processes that also underlie other kinds of human activity. Although some religious people emphasize "other-worldliness" of religious experience, in fact religious cognition is not radically different from ordinary cognition. Religion, thus, is not *sui generis* – it can be reduced to simpler and better known phenomena such as the cognitive processes of the human mind. However, there is a substantial difference between this kind of reductionism and the reductionism of more traditional kind – while the latter was monocausal (it simplified religion by reducing it to one type of factors such as psychical or social factors), the former is polycausal (it takes into account many different factors).

What is important in the cognitive approach to the study of religion and what at the same time differentiates it from most classical approaches is the emphasis on studying actual religious thought instead of studying only official religious doctrines. Religion is not limited to reflective beliefs, i.e. beliefs which are created at the theological level, but it is, above all, constituted by thought characteristic for

folk religion. It has been already acknowledged by many religious scholars that the latter substantially diverges from theological dogmas. The identification of religion with explicit theological beliefs, which constitute an official doctrine of a particular religion, at the expense of non-reflective beliefs results in a distorted view of religion.

Most classical approaches to the study of religion were dominated by a reluctance to search for the natural foundations of religious phenomena and to refer to the evolutionary theory and disciplines such as evolutionary psychology. They were either a version of transcendentalism or a version of socio-cultural approach (Slone, 2004). The latter, widespread among today's scholars of religion, is based on so called Standard Social Science Model, a view according to which the human mind is a blank slate and all human norms and practices are learned (Tooby & Cosmides, 1992). It means that human biology is relatively unimportant in understanding of culture and society. When applied to religion, this model assumes that religion understood as a domain of culture should be studied merely from the perspective of the social sciences. However, a good deal of recent research makes the 'blank slate' theory of mind problematic (cf. Tooby & Cosmides, 1992). Cognitive scholars of religion subscribe to the criticism of the Standard Social Science Model.

Religion as a natural phenomenon

Religion is, first and foremost, a natural phenomenon. This naturalness of religion thesis, formulated by Pascal Boyer and several other scholars, claims that the content and structure of religious representations depend on non-cultural, universal cognitive constraints, which have their source both in human evolution, especially in the evolution of human mind/brain, and in the features of the environment (Boyer, 1994, p. 3). Moreover, the naturalness of religion means that religion is based on natural (i.e. ordinary) cognitive mechanisms, instead of being based on specific cognitive abilities, experiences or emotions. Thus, it should not be taken for granted that religion differs essentially from ordinary life. But if religion is a natural by-product of ordinary cognitive processes, then it is not surprising that religious ideas are ubiquitous – the cultural universality of religion is a consequence of its naturalness. Since most religious ideas are intuitive and spring from ordinary cognition, human beings are, in a sense, predisposed to be religious. At the same time, the rejection of all religion is less natural than belief in supernatural beings. "Being an atheist is not easy. In many ways, it just goes against the grain. As odd as it sounds, it isn't natural to reject all supernatural agents." (Barrett, 2004, p. 108).

According to Robert N. McCauley, there are two types of naturalness: practised and maturational. The former characterizes skills such as writing or playing the piano. They were invented by men and before they became familiar and automatic for a given person, they had to be practiced under the tutelage of a teacher. The latter characterizes skills such as walking or chewing whose acquisition does not

require any institutional support; children learn them on their own (McCauley, 2011, p.25). Religion is natural, first of all, in that second sense:

> Religion in its popular, that is, widespread, forms incorporates assumptions that are more common, materials that are more familiar, and judgments that are more intuitive than in the case with either science or theology. Religion in this sense employs ideas and forms of thought that are naturally appealing to the human mind, because they are rooted in maturationally natural cognitive dispositions and the kinds of knowledge they support, which are available to most children by the time they reach the school age. (McCauley, 2011, p. 154)

Folk version of religion is not learned, but rather based on innate biases, and this is why some researchers call children under five years of age 'intuitive theists' (D. Keleman, 2004).

Why religious ideas are successful? The structure of religious representations

At first glance, religious representations, that is, ideas of supernatural beings, are very diverse across cultures. Suffice it to compare two religious traditions such as e.g. Christianity and Sikhism to note substantial differences between them. In fact, the apparent variability of religious ideas is not unbounded. As it will be pointed out, the number of possible forms of religious representations is highly limited. What is common to all religions, at least at the level of so called folk religion, is belief in supernatural beings, that is, gods. By gods I mean not only all-knowing and omnipotent beings known from the holy scriptures of monotheistic religions but also entities such as ghosts, angels, evil spirits etc. Although people create a great number of religious ideas, not all of them are equally well transmitted in a given culture. There is a body of research suggesting that cultural transmission of representations depends on the architecture of human mind and on the way the mind operates. In consequence, representations undergo cultural selection – some of there become more successful than others.

Which religious representations are successful, i.e. widespread? According to Pascal Boyer (2001), most effectively transmitted are those representations which comply with intuitive ontology in a specific way. Intuitive ontology is a set of intuitive expectations concerning the nature of the world. It involves such fields of folk knowledge as intuitive physics, biology and psychology. For instance, a belief that a man cannot go through a wall, that elephants bear young elephants or that other people have minds are examples of intuitive beliefs which make up intuitive ontology. Most successful are those religious ideas which are minimally counter-intuitive. The counter-intuitiveness of a concept consists in its violation of intuitive expectations connected to the ontological category (conceptual scheme) to which

this concept belongs. If Boyer is right, there are only five ontological categories: person, animal, plant, artefact, natural object. Take, for example, the category of person and intuitive expectations people have about this category. People believe intuitively (unconsciously) that persons have minds, can perceive, think, feel, predict; they are embodied and cannot go through solid objects. But try to violate one of these expectations, for example the last one, which says that people cannot go through the wall and you will have a counter-intuitive (supernatural) idea of person, that is, the idea of ghost. Ideas of ghosts are basically intuitive ideas because they fulfill a great number of intuitive expectations connected to the category of person: like all other persons ghosts have minds, can perceive, think, feel, predict etc. However, they also comprise some minor violations of intuitive expectations: they are bodiless and can go through the wall. In other words, religious ideas can be described as minimally counter-intuitive ideas, i.e. ideas that conform to most expectations concerning a given ontological category but at the same time violate one or several expectations.

Recent research on the recall of concepts suggests that most readily acquired and recalled are concepts in which there is a balance between intuitive and counter-intuitive features (Barrett & Nyhof, 2001; Boyer & Ramble, 2001). Minimally counter-intuitive ideas have a greater chance to become successful, because they are easily remembered and transmitted. The interrelationship between the counter-intuitiveness and memorability is better seen if one examines the memorability of an entire set of beliefs instead of the memorability of an individual belief (Atran, 2002, p. 106).

Ontological categories	**Violations of intuitive knowledge**		
	Psychology	**Biology**	**Physics**
Person	Person who knows everything	Person who does not need to eat in order to live	Person who is invisible
Animal	Snail who speaks	Dog who is immortal	Bear who can be in two different places at the same time
Plant	Plant that can hear human requests	Bush made of metal	Tree that does not have weight
Artefact	Hammer that feels hurt	Shoe that puts down roots	Car that can be sifted through a sieve
Natural object	Icicle that likes music	Diamond that was born	Rock that can go through solid objects

***Table 1**: Boyer's catalogue of supernatural concepts (adapted from Barrett 2000, p. 31)*

Religious ideas are not completely different from intuitive ideas; they come to existence as a result of minor deviations from these ideas. The catalogue of possible violations of intuitive expectations concerning ontological categories is limited to

the combination of five aforementioned ontological categories and three domains of intuitive knowledge (see table 1). Thus a catalogue of counter-intuitive ideas can be reduced to a dozen or so templates. Knowing the mechanism that generates religious supernatural representations, one can present a recipe for creating a supernatural idea:

> To produce a good supernatural concept, you must describe something as belonging to an ontological category. But there are not many different ontological categories. Indeed, we have some reasons to think that ANIMAL, PERSON, TOOL (including many manmade objects other than tools proper), NATURAL OBJECT (e.g., rivers, mountains) and PLANT more or less exhaust the list. Once you have the ontological category, you must add a violation. But we also have evidence that there are not that many violations that can preserve expectations in the way described here. As we saw above, some violations are cognitive dead-ends. You can imagine them but you cannot produce many inferences about the situation described. (Boyer, 2001, p. 90)

When one tries to explain the success of religious ideas, the explanation cannot be limited to the aforementioned cognitive features of representations. Not all counter-intuitive ideas are equally successful. Moreover, not all counter-intuitive ideas are religious. For example, the idea of Donald Duck is minimally counter-intuitive but it is obviously not religious. It means that there are other important conditions that have to be fulfilled in order for an idea to be religious. As Boyer (2001) points out, religious ideas should be about agents (most salient among them are those that are about persons), social interactions and moral intuitions.

Theological correctness: intuitive and reflective thought in religion

As it was pointed out before, students of religion have a tendency to focus upon theological doctrines, which are products of advanced theological reflection. Most textbooks in the history of religions present rationalized and systematized theological concepts and systems rather than the actual beliefs of ordinary religious people. From the cognitive point of view, it seems, however, that abstract concepts and doctrines are relatively unimportant for ordinary believers. If we ask religious believers in what they believe, they will refer to learned doctrinal knowledge. This does not imply that they use doctrinal knowledge in their everyday thinking. As psychologist Justin Barrett (1999) observed, when asked about their beliefs, religious people answer in terms of learned orthodox theological doctrine, i.e. they speak in a theologically correct way, but in everyday thinking they often ignore theological knowledge and think in much more intuitive, anthropomorphic way. Theological correctness is a hypothesis according to which in religious thought there are two parallel levels of representation whose corresponding elements can be mutually exclusive (Cf. Barrett, 1999).

This phenomenon can be also observed beyond religion. Similar correctness, let's call it intellectual correctness, takes place when one thinks about the sun. When one admires a beautiful sunset at the seashore, one believes that the sun sets behind the horizon; but if someone asked one whether it is literally true that the sun sets behind the horizon, one would probably say: "no, it is just an illusion produced by our anthropocentric point of view". Reflectively, one can think about the sun in a Copernican way, but when it comes to one's everyday experience (intuitive thinking), one has a strong tendency to think about the setting sun. As it will be pointed out in the next section, human beings are prone to interpret natural phenomena not only from the human point of view, but also in terms of intentional action.

There are many examples of theological correctness. Christian believers have an idea of nonphysical, shapeless, omnipresent, all-knowing God but at the same time think about God as an old man living in heaven. In some Christian denominations people believe that human behaviour is not free because it was preordained by God's will – they think that everything in their lives was planned in detail. But at the same time, in everyday life they act as if they had free will. Theravada Buddhism rejects the belief in supernatural beings and refers to impersonal principles; however, Buddhist believers repeatedly ignore these impersonal principles, which in Europe were believed to be the essence of this religious tradition, and turn to more personal beings. It is conceivable that the observed discrepancy between religious teaching and actual behaviour of religious believers can be explained in terms of theological correctness.

How is theological correctness possible? How it is possible that one and the same religious person can think about a deity in many, often inconsistent, ways? It is possible owing to the cognitive architecture of the human mind. There are two levels of representation: non-reflective (let's call it intuitive) and reflective. While the former fits in with intuitive knowledge about things in the world and causal relations between them, the latter include relatively abstract knowledge transmitted in religious education, by the means of theological treatises, catechisms etc. These two types of beliefs are not completely disparate: religious beliefs can be placed on the continuum from most simple and concrete to most complex and abstract. Intuitive beliefs are "concrete, commonsense descriptions of the real world derived from perception and spontaneous, nonconscious inferences" (Tremlin, 2006, p. 137). They function in the background of everyday thinking and support conscious thought. On the other hand, reflective beliefs are products of conscious thought or come from external sources such as parents, teachers, books. People usually do not have reflective beliefs unless they are asked about them. (Tremlin, 2006)

Religious thought is composed of both reflective and intuitive representations. Although at first sight one may have an impression that reflective concepts and beliefs are more fundamental and important in religion and that intuitive ones play a marginal role, this conclusion is far from true. Intuitive beliefs play a fundamental

role in creating reflective beliefs and motivating to action. It seems that having reflective beliefs is not a necessary condition of being religious: there are religions which do not have any sophisticated theology at all. Rationalized theological systems, because of their little importance for the so-called "folk religion", are not in the centre of religious life. Sociological research shows that believers often just do not know the orthodox doctrine or do not accept orthodox beliefs. It is nevertheless the case that rationalized doctrines fulfil many vital non-cognitive functions, especially in such monotheistic religions as Christianity, Islam and Judaism.

Why are gods basically similar to us? The theory of religious anthropomorphism

In order to be reliable religious ideas cannot be massively counter-intuitive. They must have many intuitive features which fit in with intuitive ontology. And this is the reason why so many God's concepts are anthropomorphic. Religious anthropomorphism is a very common phenomenon. Contrary to widespread opinion, anthropomorphism is not limited to primitive and ancient religions (e.g. Roman or Greek religion, indigenous African religions), but it is also very common in universalist faiths such as Christianity, Judaism or even Buddhism. Although in the Western world the idea of a transcendent God, i.e. a God that is completely different from humans, has been a popular part of religious teachings, in most parts of the world religious people believe in gods that are very similar to human beings. According to Stewart Guthrie (1993), an author of a cognitive theory of religious anthropomorphism, in many religious traditions gods are ancestors of men, are killed by men, they eat human and divine food, have physical disabilities, are mutilated by men etc.

Generally speaking, anthropomorphism is an attribution of human characteristics to the non-human world. It is widespread in religions as well as in other areas of human activity – in literature, in the arts, in everyday life, and even in science. People see faces in the clouds, hear voices in the wind, and talk to their computers and cars as if they were intentional beings. We anthropomorphize because we are especially interested in other people. Our perceptual system is strongly biased towards anthropomorphism because it evolved in the environment where the over-attribution of human characteristics to the world had an adaptive value. Survival in the evolutionary past "required that we interpret ambiguous objects and events firstly as those possibilities that matter most" (Tremlin, 2006, p. 99). And what matter most were other humans. The bias towards anthropomorphism was adaptive because "the consequences in failing to detect an agent were potentially much graver than mistakenly detecting an agent that is not there" (Barrett, 2004, p. 406).

Guthrie (1993) claims that anthropomorphism is not only a feature of religion but religion is, first and foremost, a kind of anthropomorphism. Religious anthropomorphism differs from anthropomorphism in other domains of human

culture in that it is more systematic, elaborate, enduring and shared by groups of people. Some cognitive scholars of religion hypothesize that anthropomorphism is a result of functioning of a mental module called hyperactive agent-detection device. (Barrett, 2000) This is an evolved mental module that had an adaptive value in the environment of our Pleistocene ancestors. It is still active, although not always adaptive today, and makes people see agency where there are no agents at all.

Religion as a by-product of the evolved cognitive mechanisms

There are many other psychological mechanisms which underlie religious cognition. Among them the most important are folk psychology and naïve "theory of mind", folk physics and biology, mechanisms underlying such activities as nepotism and kin selection, reciprocity and social exchange, coalition building, and contagion detection. When studying the role of those psychological mechanisms in religious cognition, cognitive scientists often use the achievements of evolutionary psychology, that is, a discipline which is interested in the study of the human brain/mind from the evolutionary point of view. Like sociobiology, it is based on the theory of evolution and attempts to explain human behaviour in terms of this theory. But contrary to sociobiology, it does not connect genes with behaviour immediately but postulates the existence of mind equipped with the set of mental tools which play a fundamental role in explaining behaviour. Evolutionary psychology is interested in why the mind evolved in the way it did, what its constituent parts are and what functions they fulfil? (Buss, 1999). According to Sven Walter (2009), the key ideas formulated by its representatives are the following:

> (1) The claim that the cognitive mechanisms that are underlying our behavior are adaptations. (2) The idea that they can be (…) discovered by means of a method known as "functional analysis". (3) The claim that these cognitive mechanisms are adaptations not for solving problems prevalent in our modern environment, but for solving recurrent adaptive problems in the evolutionary environment of our ancestors. (4) The idea that our mind is a complex set of such cognitive mechanisms, or domain-specific modules. (5) The claim that these modules define (…) our universal human nature.

Not all products of evolution are adaptations, i.e. characteristics that evolved by natural selection and solved survival and reproduction problems faced by our ancestors. There are also so called by-products of adaptations, that is, characteristics that do not play any functional role but are related to adaptations. For example, while the umbilical cord is an adaptation because of its functional role, the navel is a by-product. Although it is related to an adaptation, it does not play any adaptive function (Buss, 1999).

Evolutionary psychologists of religion divide into two major groups: those who explain religious behaviour in terms of adaptations, let's call them adaptationists,

and those who explain it in terms of by-products, and thus can be called by-product theorists. From the evolutionary perspective, religion is an evolutionary riddle. It requires costly commitment, and especially affirmation of beliefs that are logically incoherent and violate intuitive knowledge about the things in the world. Apparently, religious people hold beliefs and act in ways that have no adaptive value (e.g. waiting for a miracle in face of a danger), and engage in costly behaviour (e.g. time-consuming prayer and ritual). Some religions promote destructive and self-destructive behaviour (e.g. mutilation, mortification, martyrdom, and other forms of self-sacrifice), other promote forms of altruisms that are problematic from the evolutionary viewpoint (e.g. helping strangers, "loving enemies"). Although at first sight all these phenomena make religion highly non-adaptive, adaptationists claim that religiousness has many adaptive functions which counterbalance the costs associated with religion (Bulbulia, 2008). It must be remembered that calling religion an adaptation is merely a useful simplification. When one talks about the adaptive character of religion, one does not have in mind religion in general or any particular religion but rather concrete religious behaviour.

A by-product theory, which is more widely accepted among cognitive scientists of religion, claims that instead of being an adaptation, religion is a by-product of psychological mechanisms that were designed by natural selection to serve other functions. These mechanisms themselves were, or still are, adaptations but it does not imply that their cognitive products are also adaptive. Several such mechanisms have been proposed in the literature, and some of them have been referred to earlier. What is important is that religious thought is not based on a specific cognitive process but rather on a set of ordinary mental mechanisms. The functioning of these mental mechanisms is usually not consciously accessible (Boyer, 2003, p. 119).

Why gods won't go away? A few words about the future of religion

It seems that the cognitive paradigm in the study of religion explains why religion is ubiquitous and why, despite many predictions about its decline, it is still alive in today's societies. As one of the leading sociologists of religion points out, "the world today, with some exceptions (…) is as furiously religious as it ever was, and in some places more so than ever. This means that a whole body of literature by historians and social scientists loosely labelled 'secularization theory' is essentially mistaken." (Berger, 1999, p. 2). Why this is the case? The cognitive science of religion provides a reliable explanation of this phenomenon: religious thought and behaviour are by-products of ordinary cognitive mechanisms. As long as the cognitive architecture of the human mind remains the same, it is unlikely that religious ideas will completely disappear from modern societies.

References

Atran, S. (2002). *In Gods We Trust: The evolutionary landscape of religion*. Oxford: Oxford University Press.

Barrett, J. L. (1999). Theological correctness: cognitive constraints and the study of religion. *Method and Theory in the Study of Religion*, 11, 325-339

Barrett, J. L. (2000). Exploring the natural foundations of religion. *Trends in Cognitive Sciences*, 4 (1), 29-34.

Barrett, J. & Nyhof M. (2001). Spreading non-natural concepts: the role of intuitive conceptual structures in memory and transmission of cultural materials. *Journal of Cognition and Culture*, 1 (1), 69–100.

Barrett, J. L. (2004). The Naturalness of Religious Concepts: An Emerging Cognitive Science of Religion. In P. Antes, A. W. Geertz and R. R. Warne (Eds.). *New Approaches to the Study of Religion*. Vol. 2: *Textual, Comparative, Sociological, and Cognitive Approaches.* Berlin: Walter de Gruyter, 401-418

Barrett, J. L. (2004). *Why would anyone believe in God?* Walnut Creek: AltaMira Press.

Berger, P. L. (1999). The desecularization of the world: a global overview. In P. L. Berger (Ed.), *The desecularization of the world: Resurgent religion and world politics*. Washington: Ethics and Public Policy Center.

Boyer, P. (1994). *The naturalness of religious ideas: A cognitive theory of religion.* Berkeley: University of California Press.

Boyer, P. (2001). *Religion explained: The human instincts that fashion gods, spirits and ancestors*. London: William Heinnemann.

Boyer, P. (2003). Religious thought and behaviour as by-products of brain function. *Trends in Cognitive Sciences*, 7(3), 119-124.

Boyer, P. & Ramble, Ch. (2001). Cognitive templates for religious concepts: cross-cultural evidence for recall of counter-intuitive representations. *Cognitive Science*, 25, 535-564.

Bulbulia, J. *et al.*, (Eds.) (2008). *The Evolution of Religion: Studies, Theories, and Critiques*. Santa Margarita: Collins Foundation Press.

Buss, D. (1999). *Evolutionary Psychology: The New Science of the Mind.* Boston: Allyn and Bacon.

d'Aquili, E. G. & Newberg, A. B. (1998). The neuropsychological basis of religions, or Why God won't go away. *Zygon*, 33 (2), 187-201.

Guthrie, S. (1993). *Faces in the clouds: a new theory of religion*. New York: Oxford University Press.

Keleman, D. (2004). Are Children "Intuitive Theists"? Reasoning about Purpose and Design in Nature. *Psychological Science*, 15 (5), 295-301.

Lawson, E. Th. &. McCauley R. N. (1990). *Rethinking religion: Connecting cognition and culture.* Cambridge: Cambridge University Press.

McCauley, R. (2011). *Why religion is natural and science is not*. Oxford: Oxford University Press.

McCauley, R. N., & E. Th. Lawson. (2002). *Bringing ritual to mind: Psychological foundations of cultural forms.* Cambridge: Cambridge University Press.

Pyysiainen, I. (2001). *How religion works: towards a new cognitive science of religion.* Leiden: Brill.

Pyysiainen, I. (2004). *Magic, miracles, and religion: A scientist's perspective.* Walnut Creek: AltaMira Press.

Rappaport, R. (1971). The sacred in human evolution. *Annual Review of Ecology, Evolution, and Systematics*, 2 (1), 23-44.

DOI: 10.1146/annurev.es.02.110171.000323

Slone, J. D. (2004). *Theological incorrectness: Why religious people believe what they shouldn't*. Oxford: Oxford University Press.

Smart, N. (1973). *The science of religion and the sociology of knowledge*. Princeton: Princeton University Press.

Sperber, D. (1997). Intuitive and reflective beliefs. *Mind and Language,* 12(1), 67–83.

Thagard, P. (2005) *Mind: Introduction To Cognitive Science.* Massachussets: MIT Press.

Tooby, J., & Cosmides, L. (1992). The Psychological Foundations of Culture. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture*. New York: Oxford University Press, 19-136.

Tremlin, T. (2006). *Minds and Gods: The cognitive foundations of religion*. Oxford: Oxford University Press.

Walter, S. (2009). Evolutionary psychology. In: *Internet Encyclopedia of Philosophy*. Retrieved September 17 2012 from http://www.iep.utm.edu/evol-psy

Whitehouse, H. (2004). *Modes of religiosity: A cognitive theory of religious transmission.* Walnut Creek: AltaMira Press.

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