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SUMAR

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**Section**

## SOCIO-HUMANISTIC SCIENCES

CONTENTS

BULETINUL INSTITUTULUI POLITEHNIC DIN IAŞI
Publicat de
Universitatea Tehnică „Gheorghe Asachi” din Iaşi
Volumul 71 (75), Numărul 3-4, 2025
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# TRADITIONAL RURAL TECHNOLOGY FROM THE OPEN-AIR ETHNOGRAPHIC SECTION OF THE BRAN NATIONAL MUSEUM

BY

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**Abstract.** Research on folk art installations contributes to understanding how traditional communities ingeniously adapted their daily lives to local resources, while also providing valuable insights for heritage conservation and identifying sustainable solutions relevant to the current context. This paper addresses the traditional rural technology installations that operated in the Bran–Moeciu ethnographic area during the 19th and 20th centuries. The study was conducted on the three traditional rural architecture monuments that complete the open-air ethnographic section of the Bran National Museum and had as a starting point an in-depth field research, aiming to identify the exact original locations from where they were acquired and subsequently relocated to the museum. The conclusions complement older studies that were carried out in the Bran–Moeciu ethnographic area, focusing on folk art installations in general, but never specifically on the three pieces analysed in this paper. Therefore, the current research brings a new and original contribution to the field, enhancing our understanding of local heritage and traditional technologies.

**Keywords:** installations; traditional; peasant; monument; museum.

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## 1. Introduction

Traditional peasant technology in rural Romania is a direct expression of how communities adapted to the geographical, historical and economic conditions of the time. In the Bran area, a region strategically located at the confluence of Transylvania and Wallachia, the development of peasant installations for processing agricultural products, wool and wood underwent a complex evolution, closely linked to the basic occupations of the inhabitants, the structure of the feudal domain and interregional trade relations.

This paper aims to analyse, in three complementary sections, the main types of technical facilities used by the rural population of Bran between the 16th and 20th centuries. The first part presents the geographical and historical context of the emergence of these installations, with an emphasis on the relationship between the development of crafts and the influence of the burg as the feudal lord of the domain. The second part traces the spread and transformation of sawmills – hydraulic installations for wood processing – from the early period to the modern era. The third part analyses the craft of wool processing, using fulling mills and carding machines, with an emphasis on the legal regime, economic aspects and tensions generated by competition between village craftsmen and urban guilds.

This approach provides an overview of how traditional technical installations contributed to the economic, social and cultural dynamics of a region with a distinct historical identity, while also offering valuable insights into the beginnings of the modernisation of the Romanian rural environment.

Over time, numerous studies and research contributions have been published concerning vernacular technical installations in the Bran–Moeciu area. Nevertheless, the relocation, conservation, and museum valorization of the three monuments analyzed here have not yet been the subject of dedicated studies.

## 2. The Evolution of Peasant Installations in the Bran Area During the Brașov Rule (16th–19th Centuries)

The history of popular technology offers relevant insights into how rural communities adapted to the geographical and social conditions of the time. The Bran area, which was under the rule of the city of Brașov between the 16th and 19th centuries, offers a remarkable example of the development of peasant installations for processing wool and wood. These installations – *pive*, *dârste* and *joagăre* – emerged as an extension of traditional crafts, being deeply influenced by the historical context, trans-Carpathian economic relations and local natural resources (Butură, 1978, p. 323).

At the end of the 14th century, the construction of Bran Fortress marked the integration of the settlements in the area into a feudal domain. In 1498, the

Bran domain came into the possession of the city of Brașov, initially through a pledge (mortgage), then definitively from 1651. During this period, Brașov exercised firm control over the area through the castellan, who had military, administrative and fiscal powers (Prahoveanu, 1975, p. 101).

This institutional organisation allowed for the development of an organised rural economy, in which peasant technical facilities became a necessity for processing local products and supporting obligations to the Brașov lordship.

The growth of crafts in Bran is correlated with the economic expansion of Brașov, a city that benefited from privileges granted by the Hungarian royalty and close trade relations with Wallachia and Moldavia. In this context, the Bran Pass became an important trade route between the two sides of the Carpathians.

Pastoral transhumance played a special role, constantly connecting the village of Bran with the regions of Argeș, Muscel, Dâmbovița and Dobrogea. Thus, local products – especially woollen textiles (*zeghi*, *sărici mițoase*, *procovițe*) – were sold at fairs such as those in Câmpulung and Fieni or through transhumant shepherds. These products require an elaborate manufacturing process, which justifies the emergence of specialized facilities (Prahoveanu, 1975, p. 101).

The Bran region, with the localities of Bran, Moeciu and Fundata, is located in the Bran–Rucăr corridor and covers an area of 193 km². Nestled between the Bucegi and Piatra Craiului massifs, the area benefits from extensive meadows, pastures and forests, which have directly influenced traditional occupations (Praoveanu, 1996).

Sheep farming has been at the heart of the local economy, and wool processing, carried out both for household consumption and for trade, has led to the development of textile crafts. In order to thicken and finish the fabrics, the people of Bran built ***pive*** (fulling mills) and ***dârste*** (water-powered fulling troughs), water-powered installations.

At the same time, the rich forests supported wood processing as a basic economic activity, which required the use of **sawmills** – traditional mechanical installations used for cutting logs.

The construction of these peasant installations was made possible by a dense hydrographic network, which provided the necessary driving force. The rivers and streams in the area were ingeniously exploited by local communities, without exceeding the available resources. This model of technological adaptation to the natural environment is an eloquent example of the balance between economic necessity and natural resources.

## 3. Mills – The Oldest Documentary Evidence of Popular Installations in the Bran Area

Traditional technical installations are an essential part of the cultural and economic heritage of Romanian villages. In the Bran area, the first documentary evidence of these installations refers to **water mills**, fundamental elements of the local agrarian economy. Their development and operation reflect not only the needs of the community, but also the relations between the authorities of the time and the inhabitants of the Bran villages.

The first evidence of the existence of mills in Bran dates back to 1395, when a mill is mentioned in the village of Tohan (Direcția Județeană a Arhivelor Naționale – Brașov, *Colecția Fronius,* I, 27), then part of the Bran domain. Other documents, from 1460, indicate the operation of a malt mill near Bran Fortress, intended to supply the garrison (Direcția Județeană a Arhivelor Naționale – Brașov, *Colecția Fronius,* I, 30). These facilities belonged to the domain and were administered by the castellans, bringing significant income to the authorities of the time.

In the 14th–17th centuries, the mills mainly served the needs of the feudal estate. A major change took place in the 18th century, with the reorganisation of the estate by the are Austrian authorities. The growth of trade with Wallachia led to an increase in grain production and, implicitly, to a greater need for milling facilities. During this period, mills were built on the initiative of local residents, even in the face of official opposition, as was the case with the *colibași* (the term *colibaș* for the Bran–Rucăr area meant a dependent peasant who lived in a hut; the pastoral people from the communities traditionally called "colibași brăneni" practised local transhumance and were recognised by their modest huts and mountain lifestyle) from upper Bran in 1749, who were suspected of smuggling by the treasury authorities (Direcția Județeană a Arhivelor Naționale – Brașov, *Actele Magistratului,* no. 68/1749).

Documents from the second half of the 18th century indicate an increase in the number and diversity of mills. In 1761, two flour mills attested in Branul de Sus (Direcția Județeană a Arhivelor Naționale – Brașov, *Urbarii Bran,* 1761, package 97), and by 1786 a "new mill" appears in Branul de Jos (idem, *Urbarii Bran*, II/86/1786). These mills were leased to *colibași*, the leasing system being regulated by local authorities (idem, *Registre diverse*, IV, U, no. 74, f. 105). The price of leases increased significantly over time, reflecting the economic importance of these facilities: from 70–80 florins in the 1760s–1780s to 500–700 florins in the first decades of the 19th century (idem, *Registre diverse*, IV, M, 74, d., f. 95-96).

Documents from the time also provide information about the structure of the mills: log constructions with two millstones, covered with shingles, equipped with hydraulic wheels with cups (Direcția Județeană a Arhivelor Naționale – Brașov, *Urbarii Bran,* 1761, package 97). There is evidence of their

periodic maintenance, through repairs and replacement of parts such as wheels or spindles (idem, *Urbarii Bran*, package C, notebook 2).

Until the first half of the 20th century, the traditional mills in Bran – such as those in Cheia, Moeciu de Jos and Poarta – remained in operation, although in other parts of Țara Bârsei they had begun to be replaced by more modern, systematic mills (Prahoveanu and Ovidiu, 1981).

The mills in the Bran area are the oldest and best-documented examples of rural technology installations. Their evolution reflects the dynamic relationship between the authorities and the local community, technological adaptation and the persistence of an economic tradition centred on the exploitation of natural resources. These installations paint a picture of an active rural community, capable of sustaining its economy and contributing to the development of the region.

## 4. Sawmills in the Bran Area: Technological Evolution and Economic Relevance (16th–20th Centuries)

Within the traditional crafts of the Bran area, woodworking occupied a central place, determined by the abundance of forests and the requirements of peasant households. An essential element of this activity was the sawmill – a hydraulic wood-cutting facility used both for household purposes and for market production. This paper traces the historical evolution of sawmills in Bran, using data from the domain's financial records, lease agreements, and ethnographic research.

The first documentary mention of the existence of a sawmill in the Bran area dates back to 1504. In the registers of the castellans of Bran Castle, the sawmill is identified as a device with "eagles" (drive components), operated by a master craftsman, a carpenter and a worker (*Quellen zur Geschichte der Stadt Kronstadt in Siebenbürgen*, 1886, pp. 82-92). This already indicates a minimum level of professional organisation and a certain economic value.

The expenses for 1504 include: 12 *aspri* (a small Ottoman silver coin circulating in the Romanian lands) for transporting the log (Direcția Județeană a Arhivelor Naționale – Brașov, *Registrul de venituri și cheltuieli al Brașovului,* III, B, 4, p. 225), 10 *aspri* for the purchase of two axes and two iron rings (idem, p. 197), and 1 florin and 35 *aspri* for transporting the trunk. Between 1528 and 1529, documents attest to maintenance work, such as repairing the wheel (idem, p. 256), replacing the axle (idem, p. 313) and carrying out the necessary metalwork, performed by a locksmith from Râșnov (idem, p. 299). These data reveal a level of technological complexity that was significant for the era and the active involvement of the feudal administration of Brașov in the exploitation of resources through the administration of revenues by the castellans (Direcția Județeană a Arhivelor Naționale – Brașov, *Registrul de venituri și cheltuieli al cetății Bran*, III, B, 6, p. 57).

In the 19th century, sawmills became increasingly numerous, being built on the initiative of the peasants of Bran, a sign of economic emancipation and craft specialisation. A relevant document is the lease agreement for the Bran estate to Petcu Vasiliu, valid between 1 November 1816 and 31 October 1819. Three sawmills are mentioned here: in Poarta – belonging to Ioan and Coman Tudor Pomană; in Șimon – belonging to Ioan Coman Hărda and Gheorghe Hărda; in Moeciu de Sus – belonging to Tudor Țeposu (Direcția Județeană a Arhivelor Naționale – Brașov, *Contracte de arendări și închirieri,* package XVI, no. 5).

For each sawmill, the tenant collected a tax of "8 florins and 20 creițari" (Direcția Județeană a Arhivelor Naționale – Brașov, *Contracte de arendări și închirieri,* package XVI, no. 5), an amount that attests to the economic value of the facility. The appearance of several sawmills in different areas shows a balanced geographical distribution and their functional integration into the local economy.

By the second half of the 19th century, the number of sawmills had increased significantly, reaching **14 units** (Popescu, 1969, p. 525) spread across several villages: Poarta Village: Stanciu's sawmill and that of Iosif Pușcariu (known as Stoicănel); Șimon: three sawmills – on the Șimon Valley, at Gura Văii Sasului and at Gura Șimonului; Moeciu de Sus: two sawmills.

This density indicates a well-established wood processing network, with a direct impact on the economic infrastructure and the development of small peasant industry. At the same time, wood processing became an integral part of the rural economic landscape, providing both materials for local construction and products for trade.

The traditional single-blade sawmill continued to be used until the first half of the 20th century, coexisting with modern types of sawmills with two or three blades. The latter began to be built in **the first three decades of the 20th century**, marking a transition to more efficient production (Irimie, 1972, p. 337).

Also during this period, a sawmill appeared in Moeciu de Jos, built on the site of a former production unit for "cătrănițe" (probably shingles or wooden panels). This proves the transition from family craftsmanship to semi-industrial production, anchored in local tradition but open to modern technologies (Prahoveanu and Ovidiu, 1981, pp. 181-190).

Fig. 1 – Sawmill (photo library of the Bran National Museum).

During field research conducted for the organisation of the open-air ethnographic section at the Bran Museum, a **sawmill** (inventory number 9, Fig. 1) was acquired and added to the museum's collection. This traditional woodworking tool comes from Gura Șimonului, Șimon village, Bran commune, and dates back to the early 20th century. It is 1372 cm long and 941 cm wide. It belonged to Aron Băncilă between 1913 and 1960. It was discovered in July 1960 by Gheorghe Enescu (curator at the Bran National Museum between 1959 and 1989, co-organiser of the Ethnographic Section of the Bran National Museum and scientific consultant for the organisation of the Astra Museum Complex in Sibiu), in collaboration with Constantin Popescu, and acquired by them in October of the same year. (Born on 6 November 1934 in Titeştii Vâlcei, Constantin C. Popescu left his native land to complete his secondary and high school studies in Sibiu and Râmnicu Vâlcea. In 1962, he graduated from the Faculty of History in Iaşi, after which he began his work as a cultural founder at the Bran Castle Museum, together with his wife, the late Rica Popescu. In 1974, he was transferred to the former Culture Committee of Vaslui County to organise the new museum established there. During his more than 40 years of work in museology, he initiated, carried out and led the most interesting scientific research activities, formed and then completed museum collections of over 200,000 pieces that became part of the Romanian state's heritage for the following museums: the Bran Castle Museum, the Ethnographic Museum of the Bran Area, the "Astra" Museum of Folk Technology in Sibiu, the Râşnov Fortress Museum, the Rupea Town Museum, the Făgăraş Fortress Museum and, above all, the "Ştefan cel Mare" County Museum in Vaslui. At the same time, he contributed to the creation of ethnographic museums in rural areas and

memorial museums, such as: the Mateiaş Village Museum in Braşov, the Badea Cârţan Village Museum in the Sibiu commune of Cârţişoara, the „Emil Racoviță" Memorial House in old Șurănești, the Vutcani Village Museum, the Tăcuta Village Museum, etc.). In May 1961, Gheorghe Enescu completed the transfer, and between May and September 1962, the installation was rebuilt by Dionisie Langusis and Ioan Lupoiu (Bărboi), according to Praoveanu (2001a).

It is a sawmill with a water wheel powered by water. At the lower level, the water is channelled through a gutter to the vertical wheel, which, through a connecting rod-crank system, transforms the circular motion into a rectilinear motion, driving the saw blades. The logs are pulled by a cart running on rollers, synchronised with the water wheel. The cutting and pulling equipment is located on the upper level. The roof is gabled, made of softwood rafters, with a shingle covering that extends over the water wheel.

In May-June 1977, Gheorghe Puchianu replaced parts of the wheel with buckets, and in July-August 1988, Nicolae Ducaru and Ioan Șaramet rebuilt the roofing.

This gesture marks not only the preservation of a technical relic, but also the recognition of the cultural and historical value of the installation. The waterwheel thus becomes an object of study, but also a symbol of peasant engineering adapted to local conditions.

## 5. Waterwheels and Water Mills in the Traditional Economy of Bran (14th–20th Centuries)

The beginning of the 14th century marks a significant moment in the evolution of the textile industry in Transylvania, with **the introduction and expansion of specialised hydraulic installations** – fulling mills and water-powered fulling troughs. This development was driven by the authorities, especially among the Germanic population of Țara Bârsei and the Sibiu area, who benefited from privileges and support for the development of textile production (Bucur, 1978, pp. 228-229).

The need for raw materials – wool – stimulated the growth of sheep herds in neighbouring villages, favouring the development of transhumant pastoralism. Thus, there was a transition from the closed, autarkic economy specific to village communities to open forms of production and inter-community exchange (Bucur, 1978, pp. 228-229).

In parallel with the activity of guilds in urban areas, textile crafts also developed in villages, and products such as woollen cloth and thick hemp cloth became emblematic for the Romanian population in the Bran area. Traditionally, **the right to produce and sell these items was perceived as a historical right,** defended against attempts at monopoly by the guilds of Brașov (Moisuc, 1960, no. 425).

In this context, there was a need for textile finishing facilities: fulling mills for thickening cloth (*zeghe*), washing mills and *dârste* for clothes, *sărici* (traditional Romanian wool cloak) and *procovițe* (handwoven woollen coverlet). These are documented in the villages of the Bran domain as early as the 16th century, becoming an integral part of the local economy (Popescu, 1969, p. 525).

The 18th century brought significant development of these facilities, especially in the villages of Bran, Tohan and Zărnești, where fulling mills and drying racks were built by local landlords and potentates. An important impetus was provided by the reorganisation of the institution of the *plăieșii* (armed peasant border guard), as a result of which the *plăieșii* were given the right to produce and sell *zeghe*, not only for domestic use (Prahoveanu and Ovidiu, 1981, pp. 181–190).

This liberalisation provoked a reaction from the guilds of Brașov, who, in official documents, complained about the loss of their monopoly: peasant products were cheaper and of higher quality. A relevant example is the complaint of 17 August 1782, in which the *dârstarii de cergi* (carpet weavers) from Dârste (a former village, now a neighbourhood of Brașov) complained about direct competition from the *dârstarii colibași* (carpet weavers) from Branul de Jos and Râșnov (Moisuc, 1960, no. 978, p. 288).

Fulling mills and water-powered fulling troughs could not be built without the authorisation of the magistrate and the centumviral community of Brașov because, according to the feudal lord's status, Brașov owned the Bran domain. However, in practice, if a colon (in the Imperial Patent of 22 August 1785 – issued by the Habsburg Emperor Joseph II – abolishing serfdom, the term serf was replaced by that of colon; the latter had the right to move freely after fulfilling his obligations and the right to leave an inheritance) built a *pivă* without approval, it could remain in use for an annual fee. Thus, in 1781, the *pivă* in Moeciu owned by Radu Scânteie is mentioned as being maintained at his own expense, with an annual fee of 10 Hungarian florins (Direcția Județeană a Arhivelor Naționale – Brașov, *Venituri Bran,* package C, notebook 2, 1781).

Documents such as the 1757 Revenue Register and the 1761 land register indicate an increasingly extensive network: two mills in Moeciu de Jos, one in Cheia, one under construction "on the Turcului water" and four dârste, two of which are in Moeciu de Jos, "above the lords' meadow", and the other two in Cheia (Direcția Județeană a Arhivelor Naționale – Brașov, *Urbarii Bran,* 1761, package 97). In 1769, there were 7 *dârste* and 6 *pive* in the villages of Bran (Direcția Județeană a Arhivelor Naționale – Brașov, *Venituri Bran,* package I, C, notebook 3).

Historical documents reflect the involvement of *colibași* and officials in the construction and maintenance of these facilities. Relevant examples include: Adam al Comși, *colibaș* from Branul de Jos (1771), requests permission to build a *pivă* at his own expense and to be charged a fee of 10 florins (Moisuc,

1960, nr. 425, pp. 162-163); Iarca Misică (1792) requests permission to build a *dârstă de sărici* on the Turcului river (Direcția Județeană a Arhivelor Naționale – Brașov *Acte administrative,* p. IX, no. 19, year 3); Ion Perșoiu, a tax collector from Bran (1794), wishes to rebuild a destroyed *pivă*; Ion Coman Hărda, a juror from Șimon (1819), requests the construction of an additional *pivă* to serve 300 taxpayers (Moisuc, 1960, nr. 2139, p. 550).

Until the first half of the 19th century, there were 10 *pive* and 6 *dârste* in Bran, each subject to a tax ("canon") collected by the tenant of the estate (Direcția Județeană a Arhivelor Naționale – Brașov, *Contracte de închirieri și arendări*, package XVI, no. 2).

Socially, the owners of taverns and inns – along with those of mountains and sheep flocks – formed a wealthy class within rural communities. The confrontation between urban guilds and peasant craftsmen did not only reflect a professional conflict, but also the first signs of the disintegration of the guild system under the pressure of new production relations, heralding the beginnings *of rural capitalism.*

Documents from the first half of the 19th century provide valuable details about the types of installations and construction systems. In 1831, the inventory of Ion Stan Pivaru's estate in Moeciu de Jos mentions "a stone barn with a small house and wooden porch" and "a six-hammered wooden barn with a thatched roof" (Irimie C, *op. cit.*, p. 350). In 1833, Ion Moldoveanu requested permission to build a "pivă colda", a term that referred to a type of construction specific to the area (Prahoveanu and Ovidiu, 1981, pp. 181-190).

Modernisation continued in the 20th century: in 1927, two electric machines for preparing skeins and spinning wool were brought to Bran-Poarta, installations that would later spread to Moeciu de Jos. Some of these are still functional today, proof of the durability of adapted traditional techniques (Prahoveanu and Ovidiu, 1981, pp. 181-190).

Two such valuable pieces can be admired at **the Bran National Museum**: the *piua* and *darac* (wool machines) and the *dârsta cu vâltoare* (fulling mill). The first was acquired following the same field research session (1959-1960); for the organisation of ***the open-air ethnographic section*** of the Bran National Museum, two traditional installations for processing textile fibres were acquired, consisting of **a *piua*** and **a *darac*** (inventory number 10), which come from Colțul Cheii, Cheia village, Moeciu commune, and are representative of the popular technology used in the processing of animal and vegetable fibres. Both the fulling mill, dating from the first half of the 19th century, and the carding machine, from the second half of the same century, belonged to the Enescu family: Isaia Gheorghe Enescu (1875–1920) and Isaia Isaia Enescu (1920–1959), according to Praoveanu (2001b); see also Stoian and Tătulea (2021, p. 157).

Fig. 2 – Fulling mills and wool machines (photo library of the Bran National Museum).

The structure is a small two-storey building (Fig. 2): the *piva* is on the ground floor and the *darac* is on the first floor. The year 1910 is inscribed on the door on the first floor. The two installations were discovered in May 1959 by Boris Zderciuc and Gheorghe Enescu and were purchased in September of the same year. Boris Zderciuc (1918–1994) was a Romanian ethnologist and museographer, known for his research in the field of architecture and folk art. He was head of department at the Village Museum in Bucharest (1953–1969), researcher at the Institute of Psychology, then at the Institute of Ethnography and Folklore. His works include *Covorul maramureşean* (The Maramureș

Carpet, 1963) and *Tilișca – un sat din Mărginimea Sibiului* (Tilișca – a village in the Sibiu region, 1963), (Ștef, 2006, p. 55). The transfer was carried out in June 1960 by Gheorghe Enescu and Dionisie Langusis, and the reconstruction took place between May and September 1963, with the participation of Dionisie Langusis and Ioan Arișanu, according to Praoveanu (2001b).

**The fulling mill**, with vertical action, consists of a trough (for directing the water), a wheel (which turns the spindle), a fulling machine (which beats and thickens the fabric), a pot (the container in which the fabric is placed) and a stove (for heating the water needed for thickening). The building has a river stone foundation, stone walls bound with hot lime and a rammed earth floor. The force of the water is transmitted through a connecting rod-crank system, supplemented by transmission belts, setting the fulling rollers in motion. In June–July 1978, the wheel axle was replaced, along with some of the hydraulic cups, by Gheorghe Puchianu (Praoveanu, 2001b).

***Daracul* (wool processing machine)**, placed above the sheepfold, is used for carding wool. Its construction has a floor made of beams and softwood planks, walls made of massive carved beams joined in a "dovetail" pattern, and a gabled roof covered with scale tiles. Access is via a wooden staircase with two flights. The wool processing machine consists of cylinders with brushes (combs) that transform the raw wool into skeins. There is a carding machine with small teeth for fine wool and another with large teeth for coarser wool.

These installations are a remarkable testimony to traditional mountain crafts, highlighting the technical ingenuity and adaptation of local communities to natural resources.

Fig. 3 – Water-powered fulling trough (photo library of the Bran National Museum).

**Gățoaia's water-powered fulling trough** (Inventory number 11, Fig. 3) is a traditional installation for processing animal and plant fibres, originating from the Drumul Mic area, Moeciu de Jos village, Moeciu commune. It was built in 1846 and originally belonged to Ioan Agapie Ghica (1846–1900), then to his son, Gheorghe Ghica (1900–1954), (Praoveanu, 2019, p. 96).

The facility was discovered in May 1954 by Ioan Podea together with Maria Ghica, purchased in August 1954, then transferred by Emil Clinciu in July 1957. The reconstruction took place between September 1960 and June

1961, being carried out by Nicolae Noaghea and Dionisie Langusis, according to Praoveanu (2001c).

It consists of a wheel with cups that turns the spindle, a basket where the fabrics are thickened, a furnace for heating water, and a whirlpool for washing and thickening the fabric. In 1982, the wheel and axle were replaced by Gheorghe Puchianu. Currently, the structure is unstable, at risk of collapse, and requires restoration and partial reconstruction.

## 6. Conclusions

The study of peasant technical installations in the Bran area between the 16th and 20th centuries reveals a unique dynamic of rural civilisation, in which tradition, popular ingenuity and adaptation to the historical context contributed to the formation of a functional and efficient economic system. In an area of cultural and commercial interference, the people of Bran exploited local natural resources – water, wood, wool – through specific installations such as **sawmills, fulling mills and water-powered fulling troughs,** transforming these technical tools into veritable hubs of craftsmanship.

These installations, although simple in mechanism, reflect a broader social and economic complexity: the feudal control exercised by the city of Brașov, tensions with urban guilds, the emergence of local peasant elites and, last but not least, the first steps towards a barter economy. At the same time, the diversification of the types of installations and the introduction of modern elements (such as electrical installations in the 20th century) confirm a slow but steady transition towards modern forms of production.

Thus, the peasant installations in Bran should not be seen merely as expressions of rural technology, but also as landmarks of local identity and witnesses to a long historical process in which mountain villages managed to adapt, innovate and preserve their economic autonomy in an often restrictive geopolitical context.

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## INSTALAȚII DE TEHNICĂ POPULARĂ DIN PATRIMONIUL *SECȚIEI ETNOGRAFICE ÎN AER LIBER* A MUZEULUI NAȚIONAL BRAN

(Rezumat)

Cercetarea instalațiilor de tehnică populară contribuie la înțelegerea modului în care comunitățile tradiționale și-au adaptat ingenios viața cotidiană la resursele locale, oferind totodată perspective valoroase pentru conservarea patrimoniului și pentru a reflecta asupra relațiilor tradiționale dintre comunități și categoriile largi de public interesate (turiști, specialiști). Această lucrare abordează instalațiile de tehnică populară

care au funcționat în zona etnografică Bran–Moeciu în secolele XIX–XX. Studiul a fost realizat pe cele trei monumente de arhitectură populară care întregesc secția etnografică în aer liber a Muzeului Național Bran și a avut ca bază de pornire o cercetare de teren, pentru identificarea exactă a locului de unde au fost achiziționate și relocate ulterior în muzeu. Concluziile completează studii mai vechi, efectuate în zona etnografică Bran–Moeciu, pentru instalațiile de tehnică populară în general, dar niciodată pe cele trei piese analizate în lucrare, aducând astfel o contribuție originală în domeniu.

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# A TASTE OF INCLUSION: LESSONS FROM LE MANS FOR ROMANIA'S SCHOOLS

BY

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**Abstract.** The article is based on the experience of a five-day Erasmus+ job-shadowing (ID: 2024-1-RO01-KA121-SCH-000216656) at "École élémentaire Marceau" in Le Mans, an inclusive school organized around Localized Units for Inclusive Education (ULIS) and Personalized Instruction Plans. It details how France runs a single national curriculum with adapted delivery, flexible time between ULIS and mainstream classes, co-teaching with specialized support (sign language, Braille), accessible materials, calm acoustically treated environments, and routine formative assessment. Classroom snapshots in language, English, and math show structured group work, mini whiteboards, differentiated worksheets, and deaf educators reinforcing concepts in sign language. A comparative section notes Romania's solid policy commitments to inclusion but uneven implementation, teacher training gaps, persistent inequities, and promising local models (e.g., community-linked services) that need scaling. The article recommends Romania adopt co-teaching as a norm, standardize individualized plans, invest in environment and assistive tools, systematize formative assessment, and strengthen family–school–

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community partnerships. It concludes that, under these conditions, inclusive education becomes both rigorous and humane – layered and purposeful.

**Keywords:** inclusive education; personalized learning; comparative insights; Erasmus+ experience; equity and access.

## 1. Introduction

Between May 19–23, 2025, the primary author took part in a job-shadowing training activity under the Erasmus+ learning program "Enhance my skills for special education" (project ID: 2024-1-RO01-KA121-SCH-000216656) at École élémentaire Marceau in Le Mans (Sarthe, north-western France), together with other colleagues, teachers Daniela Răducănescu, Theodor Sîrbulețu, and Valentin Daminescu.

École élémentaire Marceau is the only fully inclusive elementary school in the Sarthe department. It educates students with diverse disabilities (hearing, visual, some with autism spectrum disorder, ADHD, and intellectual disabilities), coordinated through the ULIS framework (Local Unit for School Inclusion) and guided by a PPI (Personalized Instruction Plan). In the French system, elementary school lasts five years, typically from age 6 to 10–11, after which students transition to lower secondary (Collège).

## 2. Inclusive Education in France: Structure and Practice

In France the national curriculum is the same for all students, but teaching is adapted to individual profiles. Children are first enrolled in the ULIS program, then placed in integrative public schools (there are no separate special schools) based on their PPI and with the principal's approval. "ULIS students" are learners with disabilities in public schools; "ULIS teachers" are specially trained support teachers (e.g., sign language, Braille) skilled in differentiation, personalization, and instructional adaptation (Munteanu, 2021; Ministère de l'Éducation nationale).

Students spend "specific time" in ULIS settings and "specific time" in their regular class, depending on disability type/degree, learning level, psycho-cognitive resources, and their PPI. Each class may include 1–3 ULIS support teachers working with 1–6 students with disabilities; the school also has two ULIS teachers who are themselves deaf, alongside other staff trained in disability communication. Classroom teachers who host students with disabilities are not automatically trained in sign language; some learn voluntarily and design inclusive activities with the whole class.

*Language and communication*

A 90-minute language class included two students with severe visual impairments. The room featured Braille handouts, enlarged text on monitors and

worksheets, and two teachers collaborating seamlessly. The flow was calm and precise: reading, structured questioning (Who is the character? What is happening?), then entry of four additional students for text analysis with a support teacher. The entire school is acoustically treated, and teachers do not raise their voices. Materials are accessible, logically placed, and used purposefully.

Students work in groups and keep meticulously maintained portfolios, updated each lesson without disturbing others. Movement – by students with disabilities and by teachers – happens quietly and purposefully. Peers naturally assist one another; help is mutual and dignified. A designated support teacher consolidates knowledge and ensures transfer. Critical thinking is nurtured through text-based discussions and guided discovery.

*English in grade four*

The lesson begins with a recap via smartboard and flipchart (the flipchart stays in class as a persistent resource). A short film on traffic rules follows, anchoring comprehension questions and teacher explanations. After about an hour, four students with visual impairments transition with support teachers to a different room, illustrating planned flexibility and minimal disruption.

*French class dynamics*

The French lesson foregrounds group work with a return to individual tasks near the end. Methodological variety keeps attention high and allows personalized pacing without isolating learners.

*Mathematics in sign-rich environments*

In one math class focused on operations, the group consists of eight students with hearing impairments (four with cochlear implants, four with bilateral hearing aids). Two teachers launch with individual practice using mini whiteboards; students reveal answers by raising boards, enabling quick formative checks. Instruction is delivered in sign language. Midway, an assistant teacher – also deaf and exclusively signing – joins to reinforce concepts. Differentiated handouts provide worked examples and problem-solving scaffolds. Targeted attention supports a student with both hearing and visual difficulties. The session concludes with text analysis conducted in sign language, bridging numeracy and literacy.

In a grade three math lesson, “Number Labyrinth,” two assistant teachers support, one of whom is deaf; the classroom teacher also has hearing loss and communicates through total communication (speechreading and sign). Knowledge checks happen via mini whiteboards. Three hard-of-hearing students receive differentiated worksheets. Teachers encourage students who have not yet answered. The concept of symmetry is introduced using concrete

classroom objects, then extended to the schoolyard. Every student identifies at least one form of symmetry – an engaging, active learning arc.

## 3. Comparative Perspective: France and Romania on Inclusive Education

The philosophical and legal starting points for inclusion in the two nations differ markedly. France's tradition is rooted in a strong, centralized republican model that historically separated general education from the medical-social sector. The pivotal 2005 law, *Loi pour l'égalité des droits et des chances, la participation et la citoyenneté des personnes handicapées*, was a watershed moment. It established a legal right to schooling for all children with disabilities and created key institutions (Prud'homme *et al.*, 2016): the Maisons Départementales des Personnes Handicapées (MDPH), which assess needs and allocate resources, and the concept of a personalized schooling project (Projet Personnalisé de Scolarisation – PPS). The law mandates that the education system accommodate the child, theoretically prioritizing inclusion in mainstream settings.

Romania's implementation is characterized by a dual transition: from segregation to inclusion and from a focus on disabilities to a broader concept of special educational needs (SEN), encompassing socio-economic disadvantage, particularly of Roma children. The key agent is the Resource and Assistance Centre (Centrul de Resurse şi Asistenţă Educaţională – CRAE), often established with NGO help within schools. CRAEs provide support through itinerant teachers and mediators. A major innovation is the role of school mediators, frequently from Roma communities, who bridge the gap between marginalized families and the school. However, inclusion is uneven (Ghergut, 2010). While urban areas and pilot schools show progress, rural schools often lack basic infrastructure, trained staff, and resources. The system struggles with a shortage of speech therapists, psychologists, and adequately trained mainstream teachers, leading to a reliance on goodwill rather than systemic capacity.

According to UNICEF (*Quality inclusive education in Romania: A case study of systemic reform*, 2025; *Quality inclusive education package*), not having access to quality inclusive education drastically limits children's chances to fulfil their potential, to learn essential life skills and to earn a living once grown up. Although the situation of children in Romania has steadily improved over the past 28 years, challenges persist. For too many children, accessing quality education is an everyday challenge due to factors such as poverty, discrimination or lack of support from parents and the community.

In 2025, almost 400,000 children are out of school; only four in five children complete grade eight and seven in 10 complete high-school or vocational training; one in four Roma children learns in segregated classes; many children with disabilities do not go to school – their chance of completing

compulsory education is less likely than their peers; four in ten 15-year-old students barely write, read and count – pointing to unacceptable gaps in quality; one in five adolescents and young people do not go to school, receive no vocational or other training and thus cannot find employment (UNICEF, *Quality inclusive education package*).

Even if Romania has set equity and inclusion as national priorities (2008 Pact, *Pactul național pentru educație*; 2011 Education Law, *Legea educației naționale nr. 1/2011*) and aligned with European objectives, yet frequent policy shifts and underinvestment have slowed consistent implementation.

Analyses (UNICEF, 2025) highlight insufficient initial and in-service training for inclusive pedagogy, signalling the need for large-scale, practice-embedded professional development. Evidence that local models work: UNICEF's Quality Inclusive Education (QIE) and Minimum Package of Services (MPS) improved attendance, learning outcomes, and family–school partnerships in pilot areas, offering a viable blueprint for scaling. Comparative reports across Europe documents targeted measures to promote diversity and inclusion, offering policy levers Romania can adapt, particularly around early intervention, teacher training, and monitoring segregation (UNICEF, 2025).

Romania's path is defined by its post-communist legacy. Before 1989, children with disabilities were often institutionalized and hidden from society, with minimal educational provision. The post-revolution period, especially after EU accession in 2007, triggered a radical legal overhaul. Laws such as 272/2004 on child protection and the 2011 National Education Law enshrined the right to inclusive education. Crucially, Romania has been significantly influenced by external pressure and NGO projects, most notably from groups like "Centrul pentru Educatie şi Dezvoltare" and the Roma Education Fund, which have piloted inclusive models and advocated for deinstitutionalization.

Thus, while France's framework emerged from internal political advocacy, Romania's was heavily shaped by the need to align with EU norms and human rights standards.

In France, inclusion is managed through a spectrum of options within the official école inclusive policy. The preferred model is inclusion in a mainstream class, often supported by an Accompagnant d'Élève en Situation de Handicap (AESH), a specialized assistant. For needs requiring more support, students may be placed in specialized units within mainstream schools: Unités Localisées pour l'Inclusion Scolaire (ULIS). Only when deemed necessary by the MDPH (maison départementale des personnes handicapées) are children directed to external, specialized medical-educational institutions. The system is highly structured and relies on a vast bureaucracy (MDPH) and a large, though often underpaid and precarious, workforce of AESH. A significant challenge is the "medical" perspective that still dominates the MDPH's assessments, which can focus more on deficits than pedagogical potential.

Both countries face distinct, yet sometimes parallel, challenges. In France, criticism centres on the gap between legislative ambition and reality. The bureaucratic process through the MDPH is often slow and alienating for families (Prud'homme *et al.*, 2016). The reliance on AESH, while crucial, has created a two-tier classroom where the child is seen as the assistant's responsibility rather than fully the responsibility of teachers. Teachers frequently report a lack of training to adapt pedagogy for diverse needs. Furthermore, the persistence of a separate, well-funded medical-social sector creates an institutional pull away from mainstream inclusion, especially for children with complex disabilities.

Romania's primary challenges are resource-based and attitudinal. Chronic underfunding of education translates into large class sizes, dilapidated buildings, and poorly paid teachers, making differentiation nearly impossible.

Deep-seated stigma and low expectations towards children with disabilities and Roma children persist among educators and the broader public. The system is fragmented, with successful inclusion often dependent on the presence of a driven principal or an active NGO project, rather than being a universally guaranteed standard. The rapid pace of policy change has also, at times, outstripped the system's capacity to implement it effectively.

The comparative analysis of inclusive education in France and Romania reveals two nations at different stages of a complex journey. France presents a paradox: a mature, well-resourced, and legally advanced system that nevertheless struggles with bureaucratic rigidity, a residual medical model, and the practical integration of support within pedagogy. Its challenge is to move from a schooling model to a truly educational and inclusive one, where diversity is seamlessly woven into teaching practice.

Ultimately, both countries exemplify the universal tension in inclusive education between rights-based ideals and on-the-ground realities. France must decentralize and humanize its sophisticated apparatus, while Romania must secure the sustained investment and cultural shift needed to make its progressive laws a reality for every child. Their comparative experience underscores that inclusive education is not merely a policy toggle but a continuous process of systemic adaptation, teacher empowerment, and societal change.

*What Romania can adopt from the Le Mans model*

Romania is engaged in a foundational struggle. It is attempting to construct an inclusive system almost from scratch, against a backdrop of economic constraints and a history of profound exclusion. Its efforts, galvanized by EU integration and civil society, are pioneering in their community-based approach (mediators, CRAEs) but are hampered by systemic underinvestment and enduring social prejudices. Below are some recommendations Romania could further tackle:

- Co-teaching as a norm: Pair general teachers with specialized support teachers in mainstream classrooms to enable real-time differentiation.
- Structured individualized pathways: Standardize high-quality individualized plans (PPI equivalents) with scheduled time in specialist and regular settings.
- Environment and routines: Invest in acoustics, assistive tech, and classroom routines that reduce noise and cognitive load.
- Formative assessment at scale: Use low-friction tools (mini whiteboards, exit tickets) to keep expectations high while personalizing support.
- Community integration: Expand QIE/MPS-style school–family–community partnerships to sustain attendance and learning beyond the classroom.

*Pedagogical principles that make the difference*

- Student-centred design: Active learning, critical thinking, motivation, personalization, teamwork, and collaboration form the spine of classroom life.
- Culture of calm and clarity: Acoustic treatment, measured tone, clear routines, and intentional movement reduce cognitive load and behavioural friction.
- Differentiation as standard practice: Materials (Braille, enlarged print, visual scaffolds), methods (group work, mini whiteboards, explicit modelling), and pacing are tuned to individual needs.
- Visible collaboration: Co-teaching, role-specialization (support, consolidation, fixation of knowledge), and flexible grouping normalize help-seeking and help-giving.
- Values in action: Empathy, tolerance, cooperation, participation, solidarity, openness, and acceptance are not slogans but daily habits.
- High expectations with real supports: The same curriculum, adapted pathways, and persistent formative assessment keep standards rigorous and attainable.

## 4. Conclusions. Implications for Romanian Education

The authors believe that students with mild to moderate disabilities can and should be integrated into mainstream education – provided they have consistent, well-trained support teachers present across learning activities. What one of the authors witnessed in Le Mans is not a special case; it is a system made coherent by design: clear entry pathways, individualized plans, collaborative staffing, environmental adaptations, and a pedagogy that treats difference as a resource.

This is the kind of normality Romania can cultivate. It begins in families – with expectations, respect, and care – and continues in schools where

teachers work with devotion, attention, and genuine affection, within a serious and rigorous framework. It extends into society, which must align its values with inclusive practice. Children are not disturbed by others; teachers intervene calmly, students show one another equal regard, and learning proceeds with purpose. In such conditions, the educational act approaches perfection, with every layer serving a purpose.

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## O DOZĂ DE INCLUZIUNE: LECȚII DE LA LE MANS PENTRU ȘCOLILE DIN ROMÂNIA

(Rezumat)

Articolul se bazează pe experiența unei observări a muncii (job-shadowing) de cinci zile în cadrul programului Erasmus+ (ID: 2024-1-RO01-KA121-SCH-000216656)

la „École élémentaire Marceau” din Le Mans, o școală incluzivă organizată în jurul Unităților Localizate pentru Învățământ Incluziv (ULIS) și a Planurilor Personalizate de Învățare. Se detaliază modul în care Franța implementează un singur curriculum național cu predare adaptată, cu flexibilitate în circulația elevilor între clasele ULIS și cele obișnuite, cu predare în tandem (co-teaching) cu sprijin specializat (limbaj semnelor, Braille), cu materiale accesibile, medii liniștite tratate acustic și evaluare formativă curentă. Instantanee din orele de limbă franceză, engleză și matematică prezintă munca structurată în grupuri, mici table albe, fișe de lucru diferențiate și educatori surzi care consolidează conceptele în limbajul semnelor.

O secțiune comparativă notează angajamentele politice solide ale României pentru incluziune, dar și implementarea neuniformă, lacunele în formarea cadrelor didactice, inechitățile persistente, precum și modele locale promițătoare (de ex., servicii legate de comunitate) care necesită extindere.

Articolul recomandă ca România să adopte predarea în tandem ca normă, să standardizeze planurile individualizate, să investească în amenajarea mediului și în instrumente asistive, să sistematizeze evaluarea formativă și să consolideze parteneriatele școală–familie–comunitate. Concluzia subliniază că, în aceste condiții, educația incluzivă devine atât riguroasă, cât și umană – stratificată și cu scop bine definit.

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# WHY EDUCATION MUST EVOLVE TO FACE THE NEW PARADIGM OF CYBER-INSECURITY

BY

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**Abstract.** The evolving digital threat landscape, where cyberspace is a new domain of conflict and crime, demands a fundamental shift in education. Moving beyond outdated models, schools must integrate cybersecurity principles across the entire curriculum to foster “Cyber Citizenship”. This involves teaching students critical thinking to combat disinformation, ethics for navigating digital spaces, and practical skills to protect their data.

Furthermore, education must prepare a future workforce to address the cybersecurity shortage and must itself secure its digital infrastructure against multiple threats. Ultimately, education is no longer a passive observer but the essential bedrock for building a digitally resilient society, requiring a new paradigm of learning that prepares students to secure our collective future.

Including the psychology of social engineering in the curriculum is a proactive and necessary step in educating “Cyber Citizens”. It moves cybersecurity education from a list of restrictive “don’ts” to an empowering study of human nature. By understanding the cognitive biases that make us vulnerable, students are no longer passive targets; they become critical, self-aware participants in the digital world, equipped to defend not just their data, but their own minds.

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**Keywords:** education; cyber citizenship; social engineering.

## 1. Introduction

The shift from Cold War bipolarity to today's digital battlegrounds has profound and often overlooked implications for a fundamental pillar of society, our education system. The journey from a state-centric, military-focused worldview to a complex, multi-sectoral landscape (where cyber power is a key currency and cybercrime a pervasive threat) demands a parallel revolution in how we educate future generations. The classroom is no longer insulated from the vulnerabilities of cyberspace, it is on the frontline. Criminal actors exploit not only technical vulnerabilities within software and networks but also human psychology through advanced social engineering tactics, manipulating victims into compromising their own security. A table of main criminal modalities (Alecu *et al.*, 2021; BlueVoyant, 2025; Ferenț and Preja, 2023; Imperva, *Cybersecurity Threats*; Europol, 2023; Wheeler, 2024) through cyberspace is presented below.

**Table 1**
*Main Cyberspace Threats and Vulnerabilities*

| Ways of operating | Description and Primary Objective & Method |
|---|---|
| **Phishing** | Phishing attacks target end-users, trying to trick them into divulging information or downloading malware. The email message is crafted to pressure the end-user to perform a malicious action unknowingly, aiming to obtain sensitive information, such as passwords or bank details, by usurping the identity of legitimate entities like banks, public institutions, or reputable companies via fraudulent messages. |
| **Malware** | Various forms of malware, including viruses, spyware and trojans, remain a persistent threat to cybersecurity. Malware, short for malicious software, encompasses various types of harmful programs designed to infiltrate and damage computer systems It aims to steal data, disrupt operations or gain unauthorized access, posing threats to individuals, businesses and governments. |
| **Internet of Things (IoT) Attacks** | With the proliferation of smart devices, IoT attacks are becoming increasingly common. Experts predict that over a quarter of all cyberattacks against businesses will be IoT-based in 2025.<br>IoT attacks target connected devices, exploiting vulnerabilities to gain unauthorized access, steal data or disrupt operations. |
| **Distributed Denial of Service (DDoS) Attacks** | DDoS attacks overwhelm target systems with traffic from multiple sources, aiming to disrupt services and cause downtime. While typically used maliciously, some cybersecurity firms also employ controlled DDoS techniques for stress testing. |

| | |
|---|---|
| **Business Email Compromise (BEC)** | BEC aims to deceive companies into making unauthorized fund transfers by posing as CEOs or other high-ranking officials to initiate transactions or as business partners to submit fraudulent invoices. |
| **Ransomware** | Ransomware attacks in the cyber industry are malicious software-based assaults that encrypt an organization's data, demanding payment for its release. |
| **Man-in-the-Middle (MitM) Attacks** | MitM attacks in cybersecurity involve intercepting communications between two parties to steal or manipulate information to eavesdrop or manipulate data.<br>This threat aims to compromise data integrity and confidentiality, affecting individuals and organizations across sectors. |
| **Supply Chain Attacks** | Supply chain attacks compromise software or hardware before they reach the consumer.<br>These attacks target vulnerabilities in an organization's network of suppliers and partners to compromise the primary target, aiming to infiltrate secure systems by exploiting trust relationships between businesses, meaning that supply chain attack threats extend to organizations of all sizes, potentially impacting entire industries. |
| **Online Investment Scams (OIS)** | OIS lure individuals with the promise of profitable returns on their investments (often involving cryptocurrencies), ultimately leading to the theft of funds through fraudulent trading platforms. |

As global cyber threats like phishing surge, AI-driven attacks and supply chain vulnerabilities pose new challenges. The traditional education model, much like the Cold War security paradigm, was built for a different era. It operated in silos – history, science, literature – preparing students for a world where threats were often physical, borders were clearer, and authority was more centralized. This approach is now dangerously obsolete. Cyberspace constitutes a "new paradigm of criminality" and a redefined domain of power, signals an urgent need to dismantle these silos and weave a new layer of digital literacy and security consciousness throughout the entire educational journey. Cyberspace is a new domain of power, conflict, and criminality. In this context a single individual's poor security practice (e.g., clicking a phishing link) can compromise an entire organization's network.

Our digital and physical lives are intertwined. Actions online (like sharing misinformation or engaging in hate speech) have severe real-world repercussions. Just as we teach children to be good citizens in their local community, we must now teach them to be good citizens in the global digital community. It is no longer an optional skill but a core component of modern education and societal resilience.

## 2. From Digital Literacy to Cyber Citizenship

The first and most immediate action needed is to go beyond basic digital literacy. The ability to use a word processor, excel, power point or conduct online research is no longer sufficient since education must now foster what can be named "Cyber Citizenship". Cyber Citizenship (also referred to as Digital Citizenship) is the concept of developing the skills, knowledge, and ethical principles needed to safely, responsibly, and effectively participate in digital society (Singer *et al.*, 2021). It moves far beyond simple "digital literacy" (knowing how to use technology) and focuses on understanding how to use it well. It frames our online presence not just as that of a user or consumer, but as a member of a community with rights, responsibilities, and a profound impact on the digital world and the physical world it connects to.

Cyber Citizenship encompasses critical evaluation of information where students must be taught to dissect digital information with a skeptical eye. Who is the source? What is their motive? Students must comprehend that their online actions have real-world consequences, from personal data becoming a commodity to the potential for social engineering attacks. If students are provided with an ethical framework to debate topics like digital privacy vs. security, the ethics of AI, and the responsible use of emerging technology, then they will better face the new challenges of our time.

A strong Cyber Citizen is characterized by proficiency in several key areas (CLRN, 2025; Limnéll *et al.*, 2023):

1. *Rights & Responsibilities*: Understanding your rights to digital privacy, freedom of expression, and access to information; acknowledging the duty to respect the rights of others, use technology ethically, and not engage in or enable harmful behaviors like cyberbullying, hacking, or spreading misinformation.

2. *Security & Self-Protection*: This is the practical, defensive aspect. It involves proactively protecting oneself and one's community from digital threats. Key skills may include creating strong passwords and using multi-factor authentication; recognizing and avoiding phishing scams and other social engineering attacks; understanding the importance of software updates and privacy settings; securing personal devices and networks.

3. *Critical Literacy & Discernment*: This is perhaps the most crucial pillar in the age of misinformation. It involves evaluating information through critically assessing the credibility of online sources, identifying bias, and spotting fake news or deepfakes. By understanding algorithms, one can recognize how social media algorithms can create echo chambers and influence what information you see. Being mindful of the content one consumes and shares, understanding that sharing unverified information can have real-world consequences.

4. *Ethics & Legal Compliance*: Understanding that the digital world is not a lawless space. This includes respecting intellectual property and copyright

laws (e.g., not pirating software, music, or movies); understanding the legal and ethical lines around hacking, data theft, and online harassment; behaving online with the same integrity and honesty as one would in person.

5. *Positive Participation & Community Engagement*: Cyber Citizenship is not just about defense; it is about contributing positively. This means using digital tools to connect, collaborate, and create positive change, engaging in respectful and constructive dialogue, even with those who hold different viewpoint, and using technology for good, such as promoting worthy causes or helping others online.

## 3. Integrating Social Engineering Psychology into Modern Curriculum

The integration of social engineering psychology into educational curricula is not about adding a new subject, but about weaving a critical thread of understanding through existing ones. It is a shift from teaching students what to avoid ("don't click on suspicious links") to teaching them why they are tempted to click in the first place. This approach empowers them with self-awareness, making them more resilient to manipulation.

The core premise is that social engineering does not exploit software vulnerabilities; it exploits human psychological vulnerabilities – our cognitive biases and heuristics (mental shortcuts). A curriculum that includes this does two things: it demystifies the tactics of attackers and holds a mirror to our own thought processes.

This topic is inherently interdisciplinary and can be effectively introduced at various levels of sophistication, from middle school to university in classes such as:

*I. Psychology of Education/Sociology Class:*

This is the most direct placement. A dedicated module or unit on "Applied Social Psychology" or "The Psychology of Influence" can cover Robert Cialdini's principles of persuasion where students can learn the theory and then identify them in real-world examples, both legitimate (advertising, fundraising) and malicious (scams) such as (Cialdini, 2006):

1. Reciprocity: The feeling of obligation to give back after receiving something (e.g., a "free" software trial that then pressures the user to buy the full version).

2. Scarcity: The fear of missing out (e.g., "Only 3 left at this price!" or "Your account will be closed in 24 hours!").

3. Authority: We trust figures of authority (e.g., an email that appears to be from the IT department or a CEO).

4. Consistency: The desire to be consistent with our past actions or commitments (e.g., after a small interaction, the scammer asks for a larger favor).

5. Liking: We are more easily persuaded by people we like or who are similar to us (e.g., a scammer mirroring your language and interests in a romance scam).

6. Consensus (Social Proof): We look to others to determine what is correct behavior (e.g., "Thousands of people have already claimed this prize!").

*II. Literature and Media classes:*

Stories are powerful tools for teaching human nature. Social engineering may be introduced by analyzing characters and examine how villains and manipulators in literature, film, and history use these principles. Iago from *Othello* is a master of social engineering. Propaganda in *1984* or *The Hunger Games* can be analyzed through this lens.

Social engineering can be introduced to critical media literacy to deconstruct advertisements, political speeches, and social media influencer campaigns. Students can identify which principles of persuasion are being used and evaluate the ethical boundaries.

*III. Business and Economics classes:*

In the Marketing class, teachers could compare ethical marketing tactics (using scarcity and social proof) versus deceptive ones. This teaches students to be critical consumers. As for organizational security, case studies on Business Email Compromise (BEC) scams, where attackers impersonate executives could be tackled as problem solving strategies. This demonstrates the real-world financial cost of exploiting authority and urgency biases.

*IV. Computer Science and Digital Literacy:*

Teachers should frame cybersecurity not just as a technical challenge but a human one. When teaching about phishing, one should not just show examples but explain the psychology behind why they work, by explaining how scams create a heightened emotional state (e.g., "Your account is compromised!") to bypass our slow, logical thinking and trigger our fast, instinctive reactions and how video links exploits our innate curiosity.

*V. Practical, Project-Based Learning:*

A good example are the "Red Team" exercises, where in a controlled, ethical environment, students design a (hypothetical) phishing email or scam that leverages a specific cognitive bias. To create an effective attack, they must first understand the psychology deeply. This flips the script from passive learning to active understanding. This may continue with case study analysis and examine real-world breaches that started with social engineering (e.g., the Target breach). Further, students can trace the attack chains from a manipulated individual.

## 4. Conclusions

Teaching the psychology of social engineering focuses on understanding mechanisms of manipulation rather than memorizing threat categories. This approach can help students develop the ability to analyze digital interactions and respond more effectively to online risks. This transforms schools and students from passive recipients of warnings into active analysts of their own digital interactions as strong Cyber Citizens.

Integrating engineering psychology into educational curricula does more than just create safer internet users; it fosters essential intellectual and emotional skills such as metacognition that encourages students to think about their own thinking. They learn to pause and ask, "Why am I feeling this sudden urge to click? Is this emotion being manipulated?" It improves critical thinking that provides a framework for deconstructing messages and requests, moving beyond the surface content to analyze the underlying persuasive intent. Last, but not least, engineering psychology in educational curricula enhances empathy and ethics by understanding how manipulation works; students become more empathetic to victims ("There but for the grace of God go I") and more ethically aware of how they themselves might use persuasion.

Including social engineering psychology in the curriculum is indeed a proactive and necessary step. It moves the focus from the device in your hand to the mind behind it. It acknowledges that the most critical attack surface is not software, but human psychology. An educated "Cyber Citizen" is therefore not just someone who knows about firewalls and encryption, but someone who possesses digital literacy – an understanding of the architecture of information and manipulation online. They defend their data by first understanding and defending their own mind. This transforms them from the weakest link in the security chain into its most vigilant and empowered guardian. This is the evolution from user to citizen.

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## DE CE EDUCAȚIA TREBUIE SĂ EVOLUEZE PENTRU A FACE FAȚĂ NOII PARADIGME A INSECURITĂȚII CIBERNETICE

(Rezumat)

Articolul abordează peisajul amenințărilor digitale în continuă evoluție, unde spațiul cibernetic este un nou domeniu al conflictelor și criminalității, fapt ce necesită o schimbare fundamentală în educație. Depășind modelele învechite, școlile trebuie să integreze principiile securității cibernetice în întreaga programă școlară pentru a promova „Cetățenia cibernetică". Aceasta implică predarea elevilor a gândirii critice pentru a combate dezinformarea, a eticii pentru navigarea în spațiile digitale și a abilităților practice pentru a-și proteja datele.

Mai mult, educația trebuie să pregătească o forță de muncă viitoare pentru a aborda deficitul de securitate cibernetică și trebuie ea însăși să-și asigure infrastructura digitală împotriva multiplelor amenințări. În cele din urmă, educația nu mai este un observator pasiv, ci piatra de temelie esențială pentru construirea unei societăți rezistente digital, necesitând o nouă paradigmă de învățare care să pregătească elevii să ne asigure viitorul colectiv.

Includerea psihologiei ingineriei sociale în programa școlară este un pas proactiv și necesar în educarea „Cetățenilor cibernetici". Aceasta duce educația din domeniul securității cibernetice de la o listă de ce „să nu faci" la un studiu responsabil al naturii umane. Prin înțelegerea prejudecăților cognitive care ne fac vulnerabili, elevii nu mai sunt ținte pasive; ei devin participanți critici, conștienți de sine, în lumea digitală, echipați să-și apere nu doar datele, ci și propriile minți.

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# THE DYNAMICS OF OCCUPATIONAL STRESS AND ITS IMPACT ON ORGANIZATIONAL PERFORMANCE

BY

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**Abstract.** Occupational stress represents a multifaceted challenge influenced by organizational structure, technological evolution, and individual differences. This paper integrates classical theories, recent research, and original analysis, providing concrete examples and detailed explanations. The work emphasizes evidence-based interventions, physiological and psychological mechanisms, and strategies that enhance employee well-being and organizational efficiency (Selye, 1956; Lazarus and Folkman, 1984; Maslach and Leiter, 1997).

**Keywords:** occupational stress; organizational performance; psychosocial risks; adaptive coping; digital transformation.

## 1. Introduction

Organizations today operate under intense pressures from globalization, technological innovation, and rapidly changing job roles. These factors increase cognitive, emotional, and behavioral demands on employees, making occupational stress a central concern (European Agency for Safety and Health at Work, 2009). Stress arises not only from workload but also from continuous digital monitoring, fragmented communication, and rapid organizational

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transitions. For instance, healthcare professionals under persistent high-pressure conditions are more prone to errors and reduced patient satisfaction. Similarly, software developers managing multiple overlapping projects often experience cognitive fatigue and heightened error probability. Understanding stress as a dynamic interaction between individual capabilities, social support, and structural conditions is crucial for designing effective interventions.

## 2. Conceptual Framework of Occupational Stress

### 2.1. Classical Foundations

Selye (1956, p. 5) described stress as a physiological reaction to external pressures, progressing through alarm, resistance, and exhaustion phases. Extended exposure can negatively impact cardiovascular health, hormonal balance, and immune function.

Extended exposure to stress can negatively impact cardiovascular health, hormonal balance, and immune function. Empirical studies have shown that prolonged occupational stress is associated with increased risk of hypertension, metabolic disorders, and immune suppression, particularly in employees exposed to long working hours and insufficient recovery periods, such as IT specialists working under continuous performance pressure (Iurcu and Iurcu, 2007; McEwen, 1998).

### 2.2. Cognitive and Transactional Approaches

Lazarus and Folkman (1984) argued that stress occurs when perceived demands exceed available coping resources. This transactional perspective emphasizes cognitive appraisal processes, suggesting that stress is not inherent in situations themselves but emerges from the individual's evaluation of environmental demands and personal coping capacity. Consequently, individuals with similar responsibilities may experience different stress levels depending on resilience, experience, and social support (Lazarus and Folkman, 1984).

### 2.3. Contemporary Organizational Perspectives

There are three major contemporary organizational perspectives that are essential for understanding occupational stress in modern workplaces.

The first is the **Demand-Control Model** (Karasek, 1979), which posits that occupational stress is exacerbated when high job demands are combined with low levels of autonomy. In such contexts, employees constrained in decision-making while working under tight deadlines, such as software developers or administrative staff, are at increased risk of burnout and psychological strain.

The second is the **Effort-Reward Imbalance Model** (Siegrist, 1996), which highlights the stress generated when the effort invested by employees is not matched by adequate rewards, including salary, recognition, or career advancement. Customer support and service-oriented roles frequently illustrate this imbalance.

The third perspective, the **Job Demands-Resources Model** (Bakker and Demerouti, 2007), conceptualizes stress as the result of an imbalance between job demands and available resources. In contemporary digital environments, constant connectivity, frequent technological updates, and information overload significantly increase cognitive demands, making organizational support and adaptive resources crucial for sustaining motivation and performance.

## 3. Sources and Determinants of Occupational Stress

### 3.1. Task-Related Demands

Excessive workload, tight deadlines, and multitasking cause cognitive and physiological strain. Excessive workload, tight deadlines, and multitasking cause cognitive and physiological strain. Emergency medical personnel, for example, who manage life-critical situations under strict time constraints, exhibit elevated cortisol levels and increased error rates.

### 3.2. Role Ambiguity and Conflict

Unclear responsibilities or contradictory expectations generate stress (Nica, 2010). Mid-level managers who mediate between executives and teams often face increased tension. Providing well-defined roles and decision-making boundaries helps mitigate stress and improve outcomes.

### 3.3. Social and Interpersonal Stressors

Hostile communication, authoritarian leadership, and workplace exclusion intensify stress. Hostile communication, authoritarian leadership, and workplace exclusion intensify stress. In a sports context, strict and unsupportive coaching can lower athlete morale and amplify burnout syndrome. Encouraging open communication and social support networks is essential for resilience.

### 3.4. Organizational and Structural Determinants

Job insecurity, rapid restructuring, and limited participation in decisions elevate stress (Nica, 2010). Job insecurity, rapid restructuring, and limited participation in decisions can increase stress. Digital transformations, for

example, carried out without adequate employee training, can generate anxiety and a decline in performance.

### 3.5. Individual Differences

Personal coping styles, resilience, emotional intelligence, and personality traits influence stress experiences. Targeted interventions to enhance these attributes empower employees to manage stress and sustain performance.

## 4. Effects of Occupational Stress

### 4.1. Physiological Outcomes

Chronic stress disrupts cardiovascular function, hormonal balance, and immune response (Iurcu and Iurcu, 2007). Chronic stress disrupts cardiovascular function, hormonal balance, and immune response. IT professionals working extended hours exhibit, for example, elevated blood pressure and cortisol levels. Brain imaging research indicates stress-induced changes in regions related to decision-making and emotional regulation.

### 4.2. Psychological Consequences

Stress results in anxiety, emotional exhaustion, burnout, and reduced motivation (Maslach and Leiter, 1997). Chronic stress leads to anxiety, emotional exhaustion, burnout, and reduced motivation. Teachers and nurses experiencing high stress report diminished professional engagement; mindfulness or cognitive restructuring programs can help restore psychological balance.

### 4.3. Cognitive Impairment

Sustained occupational stress diminishes attention, working memory, and problem-solving abilities, leading to impaired decision-making and increased error rates. Empirical research in high-risk professions such as aviation, medicine, and software development confirms that prolonged stress adversely affects cognitive performance and task accuracy (LeBlanc, 2009).

### 4.4. Behavioral Responses

Absenteeism, presenteeism, irritability, and withdrawal are common behavioral outcomes (Johns, 1996). Early detection and supportive feedback mechanisms help reduce these risks.

### 4.5. Organizational Implications

Stress adversely affects productivity, innovation, staff retention, and workplace climate. Multi-level interventions addressing individual, social, and structural factors are critical.

Moreover, the relationship between stress and organizational performance follows a curvilinear pattern. According to the Yerkes-Dodson law (1908), moderate levels of stress may enhance focus and productivity, whereas excessive stress impairs cognitive functioning, motivation, and overall performance. Leadership quality, emotional intelligence, and organizational support play a buffering role, allowing organizations to maintain efficiency while preventing stress-related decline.

## 5. Stress Management Strategies

### 5.1. Individual Approaches

Individual approaches such as mindfulness, emotional regulation, cognitive restructuring, physical activity, and resilience-building have been shown to significantly reduce occupational stress. Studies indicate that nurses and healthcare professionals practicing mindfulness report lower burnout levels, improved emotional regulation, and enhanced patient outcomes (Kabat-Zinn, 2003).

### 5.2. Organizational Measures

Participatory management, job redesign, transparent communication, fair evaluation, and employee assistance programs tackle structural stressors (Andreescu and Liță, 2006). These strategies enhance morale, reduce turnover, and improve organizational efficiency.

### 5.3. Technological Innovations

Digital tools, including real-time stress detection chatbots, offer immediate feedback and support. Combining technology with human-centered interventions amplifies effectiveness.

### 5.4. Systemic Prevention

Long-term approaches like psychosocial risk assessments, well-being initiatives, and preventive policies foster sustainable workplaces. Systemic prevention integrates individual, social, structural, and technological strategies.

## 6. Conclusions

Occupational stress is a multi-dimensional phenomenon influenced by individual psychology, social dynamics, organizational structures, and technological environments. The evidence demonstrates that stress arises not only from workload but also from role ambiguity, interpersonal conflict, inadequate support, and rapid digital transformations.

From a physiological perspective, prolonged stress activates the hypothalamic-pituitary-adrenal (HPA) axis, elevates cortisol levels, and can lead to cardiovascular and immune dysfunction. Psychologically, chronic stress contributes to burnout, anxiety, reduced motivation, and impaired cognitive functioning, which can directly affect decision-making, creativity, and problem-solving in the workplace.

This analysis highlights that leadership quality, emotional intelligence, and structured support systems are critical mediators that can mitigate these negative impacts. For example, organizations that implement participatory management, transparent communication, and equitable evaluation systems create environments where employees can effectively cope with stress, maintaining high resilience and performance. Furthermore, integrating individual-focused interventions such as mindfulness training, resilience development, and cognitive-behavioral techniques with systemic, structural approaches like workload management, role clarification, and technology-assisted monitoring offers a comprehensive strategy for long-term stress reduction. Finally, this synthesis underscores the importance of context-sensitive, evidence-based interventions.

Organizations must consider sector-specific stressors, individual differences, and evolving technological landscapes when designing policies. Proactive stress management not only safeguards employee well-being but also strengthens organizational adaptability, innovation, and competitiveness. In conclusion, a multi-level approach that combines personal, social, structural, and technological strategies is essential to creating resilient and sustainable workplaces in the modern economy.

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## DINAMICA STRESULUI OCUPAȚIONAL ȘI IMPACTUL SĂU ASUPRA PERFORMANȚEI ORGANIZAȚIONALE

(Rezumat)

Stresul ocupațional reprezintă o provocare cu multiple fațete, influențată de structura organizațională, evoluția tehnologică și diferențele individuale. Această lucrare integrează teorii clasice, cercetări recente și analize originale, oferind exemple concrete și explicații detaliate. Lucrarea pune accent pe intervenții bazate pe dovezi, mecanisme fiziologice și psihologice și strategii care sporesc bunăstarea angajaților și eficiența organizațională (Selye, 1956; Lazarus și Folkman, 1984; Maslach și Leiter, 1997).

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# TIME AND LANGUAGE IN TED CHIANG'S *STORY OF YOUR LIFE* AND DENIS VILLENEUVE'S *ARRIVAL*

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**Abstract.** This study examines the complex relationship between language, time and cognition in Ted Chiang's *Story of Your Life* and Denis Villeneuve's film *Arrival*. Both the novella and the film are based on the Sapir-Worf hypothesis, illustrating how linguistic structure determines perception and redefines human existence. The paper shows that the process of learning an alien language (Heptapod B) involves an ontological transformation, as the main character's cognition and temporal awareness are modified and her perception of life events changes from sequentiality to simultaneity. The analysis compares Chiang's restrained, objective prose with Villeneuve's cinematic translation of language, time, consciousness and communication, by pointing out the main elements of scientific inquiry, circular imagery and minimalist dialogue. Both works suggest that by learning to think in a language beyond human linguistic norms, communication is not merely an exchange of information, but an act of empathy and self-discovery.

**Keywords:** linguistic relativity; temporality; cognition; determinism; communication; language learning.

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## 1. Introduction

This paper started as an incursion into the conceptually disorienting, seemingly fragmented and unsettling experience of the encounter between the human species and an extraterrestrial one; the article gradually evolved, perhaps unconsciously, into an inquiry into the relationship between language and time. The subject has preoccupied humanity in recent decades and has frequently appeared in science-fiction literature and cinema, portrayed in ways that blend humankind's desire for knowledge and transcendence of limits with the inherent emotions that accompany the discovery of new paradigms of perceiving reality. During the pandemic, when physical isolation redefined patterns of social interaction and human connection was largely mediated through digital interfaces, Ted Chiang's novella *The Story of Your Life* and Denis Villeneuve's film *Arrival* came to my attention. Their central themes proved strikingly relevant. Although created before the pandemic, they felt uncannily pertinent in a world confronted with communicative distance and fragmentation, illustrating the urgent need to sustain understanding and empathy. The two works explore the fundamental question of communication: the inability to communicate, the possibility of building bridges of comprehension between different individuals and cultures, and the creation of connections through screens (there is a metaphor of screens and transparency that appears vividly in both works).

For readers interested in language not only from a communicational or formal standpoint, but through the lens of perception and cognition, Ted Chiang's novella *Story of Your Life* (1998) offers a rich opportunity for reflection and interpretation. The work is grounded in the Sapir–Whorf hypothesis, first presented by Edward Sapir in 1929 and later developed by Benjamin Whorf (1956), according to which the structure of a language determines how its speakers perceive and classify experience. Winner and nominee of several major science fiction awards (Nebula, Hugo), the novella gained even greater visibility through its film adaptation, *Arrival* (2016), directed by Denis Villeneuve.

## 2. Narrative Structure and Temporal Fragmentation

The plot of the novella is relatively simple and easy to summarize, even though the events are not presented linearly. Earth is visited by extraterrestrials, and communication with their spaceships—stationed in orbit—takes place through mirrors that function as interfaces. The narrator, linguist Louise Banks, together with physicist Gary Donnelly, is part of a team of experts who communicate with the aliens, known as heptapods, through a mirror, attempting to determine the visitors' intentions. Louise is the one who gradually makes progress, discovering that the heptapods employ two distinct modes of

communication and representation: a written system (Heptapod A) and a spoken language (Heptapod B). After several interactions in which the extraterrestrials do not reveal their purpose, they depart as unexpectedly as they arrived. Although humanity gains little knowledge from them, Louise learns their language, understands them, and can communicate through writing, an ability that alters her perception of reality, enabling her to anticipate future events.

Throughout their professional collaboration, Louise and Gary fall in love. From the fragmented narrative, we learn that after the heptapods depart, they marry, have a daughter, later divorce for reasons not disclosed in the text, and their child eventually dies in a mountaineering accident.

It is important to note that this is **not** the order in which events appear in the novella. The story opens and closes with scenes that take place moments before the conception of Louise's daughter and one day after her birth, narrated as if Louise already knows what will happen. The entire narrative is addressed to her unborn child; she speaks to her in the future tense, addressing her directly as "you," although the text is interwoven with philosophical and linguistic reflections in a formal, impersonal tone. Louise moves back and forth along the temporal axis, making associations between different temporal sequences and recalling both past and future with vivid clarity: "I know how this story ends ... I also think a lot about how it began, just a few years ago, when ships appeared in orbit and artifacts appeared in meadows" (Chiang, 2002, p. 92). She remembers moments with her daughter—sometimes a little girl, sometimes an adolescent, sometimes a baby—and these are interspersed with hints about the divorce and later relationships. These future fragments are woven between episodes of her work with Gary decoding the extraterrestrial language. Only gradually can the reader piece these fragments together into a linear timeline, fully realizing by the end that Gary is both her future husband and the father of her daughter.

The narrative gradually indicates that as Louise learns the heptapods' written language, she absorbs a new way of perceiving time. We discover that heptapods understand both what the future holds and what has already occurred, and for them, history is simultaneous. This raises philosophical questions: if certain intelligent beings can perceive past and future events simultaneously, how can we reconcile this with free will? If Louise, by learning their language, foresees that she will marry Gary and lose her daughter, why does she choose to follow a path filled with sorrow rather than changing her destiny? At the end of the novella, the reader realizes that Louise **consciously chooses** to allow her child to be born.

The film *Arrival*, the cinematic adaptation of the novella, diverges significantly in how it presents events. The mysterious objects that suddenly appear in the sky resemble the black monoliths from Stanley Kubrick's *2001: A Space Odyssey*. Unlike the novella, the extraterrestrial ships do not stay in orbit but land in various locations around the world, allowing military and research

teams to enter and meet the heptapods directly, separated only by a transparent glass barrier. The physicist Gary becomes Ian in the film, and the daughter is named Hannah—a palindrome that symbolically reinforces the story's temporal implications.

Because temporality cannot be conveyed through verb tenses in film as it can in writing, the early scenes of Hannah's childhood, as well as her hospitalization and death from a rare illness, are not initially understood as future events. Viewers assume these scenes precede the extraterrestrial encounters, and only midway through the film do they realize that some scenes are fragments of a future yet to unfold. The film also hints at the cause of the couple's separation: Louise tells her daughter that her father left because he could not accept something that would happen (Hannah's death). The film implies, without distinctly portraying in any of its scenes, that Ian later accuses Louise of making the wrong choice—revealing that although she knew the future, she still chose the predetermined path.

Because of cinematic constraints, the film is more dynamic, intense, and action driven. Violent scenes emerge, including global unrest caused by fear of the extraterrestrials and an attempted attack on the heptapods by frightened soldiers who plant a bomb inside the vessel. Amid this tension, Louise deciphers the alien language. In her final encounter with a heptapod, she learns that their purpose is to help humanity because humans will aid the heptapods in the distant future. Language is presented as a "weapon"—a tool that enables Louise to perceive the future. She prevents a global conflict by contacting the Chinese military leader, convincing him to withdraw his troops by repeating his late wife's last words—information Louise learns 18 months later at a peace conference.

## 3. Rewriting Reality: Language, Thought and Temporal Awareness

The themes present in both the novella and the film include communication, the ways language encodes and perpetuates worldviews, the nature of time, predestination, and free will. Communication seems the most evident theme, though it is approached differently in the two versions. Both depict the efforts of a linguist and translator trying to understand beings from a completely different universe. Several metaphors gesture toward communicative challenges and the alienation humans feel when unable to share a common linguistic framework (e.g., Louise and the colonel, Louise and her daughter, Louise and Gary).

In the film, Ian quotes a passage from Louise's book: "Language is the foundation of civilization. It's the glue that holds people together. It's the first weapon drawn in a conflict" (Villeneuve, 2016). The term *weapon* foreshadows later developments. Ian disagrees, believing that the foundation of civilization is science, not language. He prepares a list of scientific questions for the aliens,

while Louise asks, somewhat impatiently: "Why don't we just talk to them before throwing math problems at them?" (Villeneuve, 2016). To Ian, language is an instrument for extracting information; to Louise, it is relational.

In both works, language is tied to worldview. In the novella, Louise realizes that the aliens' written language consists of semagrams—semantic symbols associated with concepts—because their signs do not correspond to spoken words. This semasiographic writing system is separate from speech and is not constrained by the sequential nature of spoken language.

It gradually becomes clear that the heptapods' writing system reflects a worldview profoundly different from that of humans, which explains the limited progress in communicating mathematical or physical concepts. Conversely, ideas that humans find difficult appear familiar to the aliens—such as Fermat's principle, which states that a ray of light behaves differently when passing through various media (air, water), altering its direction depending on the refractive index. Gary summarizes it as: light always chooses the quickest path. Louise draws an analogy: just as a ray of light seems to "know" its destination before adjusting its course, the heptapods appear to know the outcome of a message before drawing the first line of a semagram.

The film cannot reproduce these linguistic discoveries in the same way, so they are conveyed through Louise's explanations to Ian or the colonel. The film similarly emphasizes the separation between written and spoken language. Louise notes: "There is no correlation between what a heptapod says and what a heptapod writes," and "unlike all written human languages, their writing is semasiographic. It conveys meaning; it doesn't represent sound" (Villeneuve, 2016). She adds that "unlike speech, a logogram is free of time," and that their writing, like their ships or bodies, has no forward or backward direction. Whereas the novella implicitly invokes the Sapir–Whorf hypothesis, the film explicitly cites it. Ian remarks that learning a new language can rewire your brain, and Louise confirms this by referencing the hypothesis: language shapes thought.

The transformation Louise undergoes while learning Heptapod B can be read as a dramatization of linguistic determinism. Her cognition adapts to a new syntax of perception, echoing Lucy's assertion that

> Language embodies *an interpretation* of reality and language can *influence* thought about that reality. The interpretation arises from the selection of substantive aspects of experience and their formal arrangement in the verbal code. Such selection and arrangement is, of course, necessary for language, so the crucial emphasis here is that each language involves a particular interpretation, not a common, universal one. An influence on thought ensues when the particular language interpretation guides or supports cognitive activity and hence the beliefs and behaviors dependent on it. Accounts vary in the specificity of the proposed mechanism of influence and in the degree of power attributed to it—the strongest version being a strict linguistic

> determinism (based, ultimately, on the identity of language and thought), (Lucy, 1997, pp. 294-295).

As her thought patterns realign, she perceives time not as a linear continuum but as a simultaneity of events. This cognitive shift parallels Boroditsky's (2011) claim that "languages shape how we think about space, time, causality, and even our sense of agency" (p. 62). Both the novella and the film extend this idea into speculative territory: by altering linguistic structure, they reimagine consciousness itself as temporal architecture. This acknowledgement of a different perception of time, life choices and sense of purpose compels Louise to ponder upon the differences between the two species, in terms of ontological experience, the distinct ways in which they inhabit and experience reality. In the novella, the linguist clearly reflects upon the divergent worldviews, which eloquently exemplifies the Sapir–Whorf hypothesis, suggesting that linguistic form determines not only thought, but being itself:

> When the ancestors of humans and heptapods first acquired the spark of consciousness, they both perceived the same physical world, but they parsed their perceptions differently; the worldviews that ultimely arose were the end result of that divergence. Humans have developed a sequential mode of awareness, while heptapods have developed a sequential mode of awareness. We experienced events in an order, and perceived their relationship as cause and effect. They experienced all events at once, and perceived a purpose underlying them all (Chiang, 2002, p. 134).

Learning Heptapod B thus enables Louise to inhabit a new mode of existence, one in which temporal sequence dissolves into simultaneous comprehension—an ontological reorientation of consciousness.

Thus, Louise's experience of learning a new language leads her to a new understanding of time and life, illustrating the Whorfian hypothesis. But beyond this, the narrative shows that empathy, openness, and awareness are essential to connecting with other cultures—no matter how different. Language not only shapes thought but also becomes an instrument for communication through cognitive and even emotional adaptation to new worldviews. Communication is portrayed not merely as transmission of information, but as an act of relational responsibility, because Louise's willingness to learn the alien language, despite its disorienting effects, mirrors this ethical openness. Her empathy—expressed linguistically and emotionally—contrasts with Ian's instrumental approach to language as data extraction.

Although the short story is written in an objective and restrained style, employing precise language, devoid of figurative ornamentation, the text conveys a quiet emotional depth. The stylistic austerity illustrates the rational tone of the entire research that both the linguist and the physicist perform in

order to establish communication and understand the cognitive framework of the alien species. Beneath the controlled prose, one can feel a deep compassion for the woman who, fully aware of her future destiny (her daughter's life and death, her divorce and even her own suggested death), still chooses to live that life nonetheless, embracing joy and grief as inseparable and natural aspects of existence. Even though the whole narrative is mostly centered upon scientific observations, dialogue concerning physics and linguistics, short, almost journal-like entries displaying fragmented vivid glimpses of Louise's daughter life, the reader experiences a very nuanced and subtle scale of emotions: curiosity, sensitivity, melancholy, empathy. Chiang's restraint does not suppress emotion, but it intensifies it, and thus, the interaction between humans and heptapods becomes a metaphor for the universal human desire to understand, to connect, to transcend the boundaries of individual consciousness. In Villeneuve's *Arrival,* emotion does not emerge from overt sentimentalism, but from moments of stillness, when camera lingers on reflections, glass screens, human movement, transforming the act of seeing into an act of understanding. Jóhann Jóhannsson's meditative music and Amy Adams's restrained performance infuse the film with a quiet humanism, balancing intellectual inquiry with intimate vulnerability. One can sense that the film mirrors the novella's analytical tone through subdued colors, minimalist dialogues, deliberate pacing, thus becoming a visual meditation on language, time, consciousness.

## 4. Conclusions

Both Ted Chiang's *Story of Your Life* and Denis Villeneuve's *Arrival* explore the intricate interwoven phenomena of language, time and cognition. The encounter of the heptapods and learning of a completely new language causes Louise to alter her memory, perception of time and reality, redefining her understanding of destiny and agency, as she accepts future joyous and tragic life events not as resignation, but as conscious affirmation of existential completeness. For Chiang, language becomes an epistemological instrument for a metaphysical threshold, allowing humanity to glimpse an alternative form of being.

While Chiang needs to clearly and objectively portray the linguistic analysis that Louise undertakes and experiences, the film translates the language and philosophical reflection into a visual grammar by elliptical editing, subdued colors and hues, and circular logograms projected on hazy screens. Both film and novella achieve a merging of scientific inquiry with philosophical considerations and emotional resonance; they both acknowledge that understanding another consciousness, even an alien one, is a complex process of self-discovery and self-reflection, a vulnerable descent into the depths of human soul and mind. By learning to think in a language that goes beyond the human linguistic patterns and norms, the central character experiences a radical

reconfiguration of perception and temporality and she embodies the possibility of empathy beyond ontological divergence.

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## TIMP ȘI LIMBAJ ÎN NUVELA *POVESTEA VIEȚII TALE* DE TED CHIANG ȘI FILMUL *PRIMUL CONTACT* REGIZAT DE DENIS VILLENEUVE

(Rezumat)

Studiul de față examinează relația complexă dintre limbaj, timp și cogniție în nuvela *Story of Your Life* de Ted Chiang și în filmul *Arrival* (*Primul contact*) regizat de Denis Villeneuve. Atât nuvela, cât și adaptarea cinematografică se bazează pe ipoteza Sapir–Whorf, ilustrând modul în care structura lingvistică determină percepția și redefinește existența umană. Lucrarea arată că procesul de învățare a unei limbi extraterestre (Heptapod B) implică o transformare ontologică, întrucât cogniția și conștiința temporală ale personajului principal sunt modificate, iar percepția evenimentelor vieții se schimbă de la secvențialitate la simultaneitate. Analiza compară stilul sobru și obiectiv al prozei lui Chiang cu traducerea cinematografică realizată de Villeneuve asupra conceptelor de limbaj, timp, conștiință și comunicare, evidențiind principalele elemente de cercetare științifică, simbolismul circular și dialogul minimalist. Ambele opere sugerează că, prin învățarea unei limbi care depășește normele lingvistice umane, comunicarea nu mai reprezintă doar un schimb de informații, ci devine un act de empatie și autocunoaștere.