Via Panorâmica

Número Especial

2014

Revista Electrónica de Estudos Anglo-Americanos

An Electronic Journal of Anglo-American Studies

ISSN: 1646-4728

Via Panorâmica

2014

Title: Via Panorâmica: Revista de Estudos Anglo-americanos
E-Journal of Anglo-American Studies

Director: Gualter Cunha

Executive Editors: Miguel Ramalhete Gomes / Márcia Lemos

Editor: Universidade do Porto. Faculdade de Letras

ISSN: **1646-4728**

Via Panorâmica é uma revista eletrónica que respeita integralmente os critérios da política do acesso livre à informação.

Via Panorâmica is an open access electronic journal that follows all the criteria of OA publishing policy.

Via Panorâmica

Número Especial

2014

Revista Electrónica de Estudos Anglo-Americanos | An Electronic Journal of Anglo-American Studies

Sumário | Contents

A Prefatory Note

Márcia Lemos | University of Porto

This special issue of *Via Panorâmica* offers a selection of papers originally presented at "Relational Forms II: An International Conference on Literature, Science and the Arts", held in December 2012 at the Faculty of Arts of the University of Porto. As its title suggests, this conference was the second in a series of academic events that reflect the research concerns of the eponymous research group (*Relational Forms*), based at CETAPS, the Centre for English, Translation and Anglo-Portuguese Studies.* The conference meant to respond to the great interest that interdisciplinary and intermedial designs have obtained in many of the areas of study pertaining not only to literature and the arts but also to the sciences. Accordingly, it placed a significant emphasis on the ways in which the discourses of literature, film, painting, music and other such cultural practices become interwoven with the discourses of science; and, conversely, on the ways in which the practices and theories of science reach beyond their more conventional boundaries and into the fields of artistic creativity and the humanities. Additionally, the conference meant to commemorate the 350th anniversary of a major event in the history of science and scientific institutions: the granting of the Charter to the Royal Society of London by King Charles II, in 1662.

The articles gathered in this issue reflect, therefore, the conference's broad scope. Indeed, while the opening article offers a detailed account of the life and legacy of Charles II, a man ahead of his time in his pursuit of science; the second paper persuasively demonstrates the contribution of Francis Bacon's Theory of Idols to the emergence of the Royal Society of London and its core concerns. A significant number of papers interestingly explores representations of science and scientists in various literary texts, ranging from English early Tudor drama and John Rastell's plays to contemporary fiction and the work of the Singaporean writer Catherine

Lim. A closing set of articles investigates the intricacies of artistic creation, providing valuable insights into the fascinating field of neuroscience.

* See *Via Panorâmica* 3rd series I (2012)

Charles II: A Man Caught Between Tradition and Science

Cristina Carvalho | Escola Superior de Hotelaria e Turismo do Estoril (Estoril, Portugal)

Introduction

Charles II was a man torn between cultural tradition and scientific progress. The son of England's only absolutist King went down in History as the nation's "Merry Monarch", while his support to Science and progress tends to be overlooked by historians. This paper presents four sections that deal with the following topics: religious traditions, scientific breakthroughs, and the King's own scientific pursuits.

In the 1600s, Charles I's open belief in the divine right of ruling and the political and personal excesses derived from that assumption were to be displayed in every possible way and kept on growing as the years went by. Taking the Arts into account, J.P. Kenyon recalls that even "the court masques of the 1630s, ever more luxurious and stylized, embodied... imperial themes, portraying a monarchy almost Byzantine in its theocratic paternalism" (126). A patron of contemporary masters like Rubens, Charles I also converted his ambassador in Venice into an art dealer in charge of purchasing Renaissance and Mannerist paintings. The high cost of the royal hobby was later another one of the straws that broke the camel's back when considering the countryside's general dim economic and social reality. In spite of owning one of Europe's finest Art collections, winds of political change were to mutilate the aesthetic taste of a generation on Continental trends due to the destruction of such precious core. As Kenyon recalls, "Charles I's great art collection was auctioned off in 1651, a transaction still regretted by many art historians" (182).

Citação: Cristina Carvalho, "Charles II: A Man Caught Between Tradition and Science". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 5-24. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

As for this paper's leading character, Charles II was born on the 29th of May of 1630, at Saint James's Palace, on a day blessed by the intense glitter of a morning star. According to Christopher Falkus, "all day long the planet Venus was visible to the naked eye, though no one could have guessed the scale of the endowment bestowed on the baby Prince by the goddess of love" (13). Brought up at Richmond Palace under the teachings conducted by the Earl of Newcastle and later by the Marquis of Hertford, the growing personality of the royal heir, as described by Maurice Ashley, was that of a young man "more absorbed in outdoor sports than in his books, and learning the politeness of court life without being [...] bothered about their social significance" (5). At the age of 12 the Prince witnessed the initial battle of the Civil Wars, at Edgehill, under the surveillance of scientist and tutor William Harvey (who was then keener on reading a book than on the bloody developments on the battlefield ahead), and looked up at cousin Rupert's military leadership. By 1646, Charles I forced his son to seek exile with his mother, in Saint Germain (Paris), fearful of the heir's safety.

In spite of the son's appeals to several European courts and to the English Parliament, Charles I was to be executed on the 30th of January of 1649. The Prince was then 19 and reality took its toll before his eyes. He soon perceived that unlike what he had been taught of, "even the sacred person of the Sovereign was not inviolate" (Ashley 5). In 1651 the now claimant to the English throne managed to be crowned at Scone (Scotland) and gathered an army meant to rescue England from Oliver Cromwell's claws. Defeated at Worcester, Charles II was to spend weeks on the run, only to find safe passage back to mainland Europe thanks to the assistance of subjects like Major Careless. Finding refuge on top of an oak tree at the Major's Boscobel House, Charles would escape from the victorious Commonwealth troops. Such commotion on the young Prince's life would later explain his fickle character. As Malpas Pearse argues, "Charles was a nervous man, afflicted by both gaiety and tragedy. His exile and his hard times had given him a common touch, which made

him popular" (106). Kenyon, who strongly criticises Charles' waste of money on debauchery and points out that such carelessness was actually a fault of the entire Stuart stock, grants another perspective: "he [Charles II] was cynical and dissolute; he wasted money on women, just like his father had wasted it on paintings and his grandfather on boys" (14).

1. Restoration & Religious Traditions

After 11 years of Republican intermission, by 1660, Charles' trusted counsellors had negotiated with Parliament his return to England and the Restoration of the Stuart dynastic line. His arrival at Portsmouth was not without ceremony – with General George Monck (Parliament's representative) kneeling down to kiss the new King's hand– and not without compromise, with Charles accepting to forgive those who had once fought against his family (the "Roundheads" or "Parliamentarians"). The sole exception was to fall on the men who signed his father's execution, for they had to be brought to justice. The 1660 Declaration of Breda and the Act of Indemnity and Oblivion were the touchstones for England's return to serenity after Oliver Cromwell's demise in 1658. All in all, Charles II "pardoned his enemies, promised to uphold the Anglican Church... and to leave all difficult questions to the will of Parliament" (Falkus 65). The Restoration recovered the Monarchy, the House of Lords, and the country's order, putting an end to the constraints once imposed by the Republic, for it was "not only a monarchy but a whole way of life [that] was being restored" (Fraser 233).

Though mooring at Portsmouth on the 26th of May of 1660, Charles spent some time at Canterbury and only on the 28th did he leave to Rochester for his triumphal arrival into London was expected the following day. Indeed, the 29th of May was the chosen date since it coincided with the monarch's 30th birthday. Three decades before Prince Charles had been baptised with water imported from the Jordan River (in the Holy Land), and the 1630 bright star that shone in the sky was

commonly accepted as the Star in the East, announcing the birth of the new Messiah (Ogilby 30). In 1660, John Evelyn, one of the period's diarists, watched the entrance ceremony and "thanked God the king had been restored without bloodshed, and by the very same army that rebelled against him" (Molloy 11).

Charles' impending coronation was planned to the tinniest of details with an aura of mysticism, divine Justice, and hope hovering over him. Starting with the Crown Jewels, all pieces of goldsmithery had to be forged from scratch, since Cromwell's orders had once been to melt or sell the symbols of royal power shortly after its extinction in 1649. The only original pieces left were the 1199 Anointing Spoon, purchased and preserved by Clement Kinnersley, and the gold collected after the melting of Saint Edward the Confessor's Crown, which was used in the making of Charles II's new Crown. The Stuart heir also reinstated the Order of the Garter and Saint George's Hall at Windsor Castle as its seat, this time with French influences after spending years exiled at the court of Louis XIV. On the 15th of April of 1661 the ceremony to bestow the Garter's honorific badges to new knights and loyal companions like brother James (II) and cousin (Prince) Rupert was held at Saint George's Chapel. The event emulated the pomp of Parisian society, since the "knights' costumes had been [...] redesigned along more elaborate lines. Possibly they were influenced by the French king's knights of the Saint Esprit" (Fraser 255). 1661 also registered the foundation of the Order of the Royal Oak (granted to those who had helped Charles to flee after Worcester's defeat) and the legislation of a new holiday, the Royal Oak Day (falling on the 29th of May, to celebrate his return and birthday, oak sprigs were worn on hats): the Royal Oak "stood as a sign of God's protection on his chosen king" (MacLeod and Alexander 11). Soon there would be no more leaves, branches or bark of the (holy) oak at Boscobel House, for the site became an unofficial pilgrimage centre during Charles' reign.[1]

The Coronation itself obeyed a key rule: that of reviving the medieval trail that once linked the Tower of London to Westminster Abbey. Scheduled for the 23rd

of April of 1661, Saint George's Day, the nation's patron's preference was to fall over Charles II on a spring morning remarkably plunged into blissful joy, for "London was blessed with glorious weather [... and] all the capital flocked to the river bank to see him" (Falkus 85). As Cristina Carvalho claims, the choice made upon that specific day can be explained by the wish to celebrate two ephemerides full of significance in a single day and the hope that Saint George's divine aura might be incorporated by the Sovereign's royal persona (117-8). Molloy's reminder that "the splendour of the pageant was such as had never been before" sustains Carvalho's opinion (Molloy 30). Time was to echo the exuberance of the moment when Charles II brought Order into Chaos, Prosperity into Repression, and Light into Darkness, thus embodying the nation protector's finest qualities. Even the allegories painted over the four triumphal arches planned by John Ogilby promoted the Stuart monarch as the Messiah of a new Golden Age (Ogilby 21-39). As MacLeod and Alexander recall, "Charles was presented to his subjects as Jupiter triumphing over his foes, as the imperial Augustus, as the biblical King David [...] and as St. George rescuing his people from the dragon of sedition" (11).

The whole trajectory was animated with masked actors, singers, and musicians, turning London's streets into the set of a moving open-air play. After a decade living only on shades of grey, Londoners were thus bewildered by the radiant colours, the glitter, and the scent of amusement of the event: "everything [...] had to be paid for. Nevertheless, the impact on observers... was all the King could have wished" (Fraser 258). Anointed the monarch by the Archbishop of Canterbury, at Westminster Abbey, the ceremony continued with the nation pledging allegiance to the ruler, the Sovereign presiding a banquet served to the nobility and the clergy at Westminster Hall, only to end with a peculiar and unexpected episode. Instead of laying his royal robes at one of London's leading Anglican temples, Charles II preferred to sail up the Thames River and offer the

garments to Thomas Killigrew's theatrical company (that he would soon sponsor and often visit). An Age of Change had arrived.

Charles II was aware that his throne rested over the respect for his forefathers' traditions and his subjects' devotion. Therefore, in spite of the brief innovations indicated and the King's kindness towards the people's spontaneous contacts, the link to God's authority was preserved or renewed through centuries-old religious rites and profane habits. On the latter, one can mention the re-erection of the Maypoles for May's Pagan worshipping of Nature's bounty (through the performance of ancient Morris Dances around the structure). Theatres were re-opened (now with female elements). Music and laughter were allowed to echo again across a nation now feasting on the long-forsaken merriment forbidden by Cromwell's Puritanism. In religious terms, Christmas was again celebrated, as were the King's Touch and Maundy Thursday ceremonies, at Lent. Considering the effects derived from his staged coronation the King's Touch was a good barometer for measuring how the people revered Charles II, since "sometimes as many as six hundred [subjects] came for their cure in a single session, and his reputation was such that he even had an occasional patient from the New World" (Falkus 77). Held at Banqueting House (in front of which Charles I's scaffold had been placed and the beheading accomplished in 1649), the King was supposed to touch the sick persons' neck to cure their scrofula (a skin disease), and to offer them a white ribbon with a gold medal depicting Saint Michael (to be worn as a sort of holy talisman). A curious episode describes how Arise Evans, a Welshman, once approached Charles II during his morning stroll near Saint James's Park and rubbed the royal hand against his nose, thus revealing the folk belief in the sanctity on the physical body of the ruler (cf. Picard 81). As for Maundy Thursday, it established a parallel with Jesus' life for rulers were supposed to wash the feet of the Poor, as the King of Kings had done, and Banqueting House was again the stage for the Lent ceremony.

Fig.1 Banqueting House[2]

A date of supreme religious importance during the Age of Charles II was the 30th of January, the mournful reminder of his father's "martyrdom". Not only were churches erected to honour the now-praised "Saint Charles I" (like at Royal Tunbridge Wells, in 1678), as the day was also one of fasting and of honouring a ruler recalled as humble, kind, and tender, a sort of lamb slaughtered by the cruelty of Men (cf. Kenyon 209). Ironically, at the age of 30, Charles II kept facial features of the «martyrised» parent, showing he was his father's son, and that Charles I was to have the Stuart's right of ruling back, like a Phoenix rising again to power (Fraser 236).

Fig.2 Statue of Charles I, Trafalgar Square, London
(with wreath of flowers placed on the 30th of January)

A superstitious cultural behaviour inherited from previous times and prescribed by physicians was the visit to the thermal springs at Tunbridge Wells, in Kent. In 1630, Queen Henrietta Maria went there to recover her health after giving birth to Charles (II), and, in 1632, Doctor Lodwick Rowzee wrote a treatise on the therapeutic properties of the waters entitled *The Queen's Wells*. By 1663, Charles II started visiting the spot with his wife, Queen Catherine of Braganza, hoping for an heir. As Anthony Hamilton mentions, since the 1630s, besides the treatments conducted on wells of rusty-coloured water, leisure was also part of the social programme at the resort: "there was dancing everyday at the Queen's House, since the doctors prescribed it and nobody objected" (Hamilton 155). It was also at

Tunbridge Wells that Charles II met his mistresses Moll Davies and Nell Gwynn, in 1668.

Considering these examples of religious revival and of the monarch's own participation on them, a question arises: was Charles II a religious man? This has been a topic of much debate among historians. As Richard Ollard emphasises: "Of all the questions on which Charles II has been suspected of duplicity both in his lifetime and in history, the largest is religion" (103). As King of England he was the leader of the Anglican Church; on the other hand, his next of kin were mostly Catholic (his French mother, brother James (II), sister Minette, and his Portuguese wife Catherine). The humiliations suffered in 1651 at the hands of the Presbyterians of Scotland (when he had to acknowledge Charles I's sins and Henrietta Maria's idolatry as a way of gaining allies to fight Cromwell) did not leave a good impression on him, and Charles was shrewd enough to understand how Religion had fragmented 16th-century Europe and England's social unity for nearly 150 years. However, he was also aware of how his French grandfather's (Henri IV) tolerance allowed France to prosper while other countries still dealt with internal skirmishes. Falkus believes the "Merry Monarch" was a sceptical, for when his mistress Louise de Kéroualle tried to convert him to Catholicism he answered with scorn and requested for a priest who knew of Science, "because there were many problems related to the scientific basis of Catholicism which he needed to discuss" (Falkus 149). Other scholars pin point his conversion to Catholicism only on his deathbed, this discrete conversion being necessary to ensure the safety of the Stuart throne, unlike his father had done and his brother would do (cf. Picard 267).

2. Restoration & Science

After the 16th-century scientific breakthroughs, the following centuries were to observe the speeding up of a new understanding of the Universe, Nature, and Man. Theological principles were casted aside by Modern Science in exchange for

experimentation and observation. And Reason was embraced as "the way forward to increase human knowledge and understanding" (Hook 109). Mathematics rooted itself as the language of the intellectual revolution at bay, thanks to men like Napier, Kepler, Pascal, Descartes, and Newton. And, while scientists at the time of Galileo were looked down or ignored by the State, conducting their endeavours thanks to private sponsorship, in the 17th century the paradigm was reversed and rulers started cherishing their innovations. The Royal Academy (1662) founded by Charles II is a good example of this reversal. The same could be said of the *Académie Royale des Sciences* (1666) initiated by Colbert (Louis XIV's Minister of Finance), and all the other academies that would soon spread across Europe thanks to Frederick I of Prussia (Berlin, 1700) or Peter the Great of Russia (Saint Petersburg, 1725). Although Francis Bacon's Scientific Method had seen the light of day at the brink of the 17th century, comets were still generally perceived as signs of bad omens, and Medicine kept on following Galen of Pergamon's theory of humours (physicians were to keep these humours balanced according to the position of the stars). Besides, people still held on to the belief that "charms and incantations could expel evil influences from the system" (Bryant 93). Thermal springs like Tunbridge Wells where Queen Catherine "went in the mistaken belief that the waters would give the throne an heir" (98), were still sought after by upper layers of an educated society. A clear sign of Charles II's dual conduct was the foundation of the Royal Society in 1662, sided with the unconscious fear that led him to protecting the ravens at the Tower of London, after being told the legend that their departure would mean England's demise under foreign forces. The law then published shows how cautious he was, after so many unexpected twists and turns in his own life.

Regarding the King's upbringing, it is worth mentioning his father's sponsorship to William Harvey (who in 1628 discovered the mechanism of blood circulation) and his nomination as the princes' tutor. The breaking of the shackles of conformity during the Renaissance justifies why the following generations were to

discuss the Cosmos, the Earth, and Man. Since 1645 a group of scientists, mathematicians, physicians, and philosophers met weekly at London's Gresham College and in Oxford, aiming at debating ideas and conducting experiments. The Philosophical Society of Oxford is considered as the embryo for the 1662 Royal Society, but Cambridge also witnessed the rise of the Invisible College at Trinity College, proving Man's inquisitive nature was restless. By 1626 Francis Bacon published *New Atlantis* where he presented Solomon's House as a venue where debating natural philosophers met, maybe foretelling the foundation of the Royal Society by Charles II. The ruler was mesmerised by the constant flow of breakthroughs, which is why "the king made science fashionable by his own burning interest in the subject [... and] he [even] wanted to examine every [...] invention before the patent was passed" (Fraser 251).

The extensive list of knowledge-thirsty minds of the dubbed Scientific Revolution includes the chemist Boyle, the geometrist Hooke, the physicist Newton, and the astronomers Flamsteed and Halley, thus revealing the early creation of different cores of scientific development. Robert Boyle was the «father of Modern Chemistry» and author of *The Spring and Weight of Air* (1660) and *The Sceptic Chymist* (1661). Believing in Alchemy, like Descartes, he defended a mechanical vision of the Universe, taking experiments as a means to understand God's Great Work. Boyle's assistant, Robert Hooke, was a Geometry professor at Gresham College and published *Micrographia* (1665), a study that describes the cellular structure of plants and the beauty of fish scales under microscope lenses. As Hart-Davis points out, "his drawing of a flea is dramatic even today, and in 1665 it must have been sensational" (166). Not only was Hooke the inventor of the word "cell", but he was also the author of "The Monument", a landmark of London's cityscape after the fire of 1666.

Fig.3 The Monument

Isaac Newton was a mathematician and a physicist who admired Copernicus, Galileo, and Kepler, teaching at Cambridge University. His main legacy was to be revealed after Charles II's rule. He was the president of the Royal Society in 1701 and he was knighted by Queen Anne in 1705. Known for the *Universal Law of Gravitation and Motion* and the *Laws of Optics,* Newton, too, believed in a mechanical conception of the Universe. In *Principia Mathematica* (1687), he compared it to a finely tuned clock created and maintained by God. Recent studies unveil his religiosity and alchemic preferences. Newton was the first scientist to have his remains buried at Westminster Abbey alongside England's monarchs (cf. Carvalho 103-5) and Dan Brown has recently used his tomb as a pivotal element for the plot of one of his books.[3]

In 1675, John Flamsteed, the first Royal Astronomer, founded the Royal Observatory in Greenwich (built by Wren), and the result of years of charting the skies was to be published by Halley, in 1725, under the title of *Historia Celestis Britannica.* Flamsteed is also reminded for the accuracy of his calculations on solar eclipses.

Fig.4 Royal Observatory, Greenwich

By 1720, Flamsteed would make way for Edmund Halley at Greenwich. A Geometry professor at Oxford, Halley financed Newton's *Principia* and applied its principles to predict the return of the comet now bearing Halley's own name. In 1676 he moved to the South Hemisphere in order to chart 341 stars. After his return and the 1678 publishing of a catalogue, he was bestowed a Master's degree by the King himself, after dedicating the study to Charles II and naming a constellation as *Robur Carolinum*.[4] The astronomer was also a member of the Royal

Society (1678-1743) and of the French *Académie Royale des Sciences* (1729-1743) (cf. Carvalho 103-5). Botany and Gardening were other areas that caught Charles II's eye and at Ham House one may still behold a Henry Danckerts' canvas in which John Rose, the Royal Gardner, grants him the first pineapple ever grown in England (cf. Tomlin 16).

3. Scientific Principles applied to the Arts

In artistic terms the Restoration coincided with Christopher Wren's early glorious period. A follower of Inigo Jones' Palladian taste and Bernini's Baroque delights, Maurice Ashley brands him as an "eclectic artist for he drew upon classical and baroque models including the work of both Inigo Jones and Bernini" (Ashley 154). An Astronomy professor at Oxford, a mathematician and an amateur architect, Wren was a founding member of the Royal Society, which he would later lead in 1680. In the summer of 1665 he visited Paris and admired in first hand Mansart's and Le Vau's works, besides having met Bernini who even revealed to him "the designs for the Louvre, for which, he says, he would have given his skin, but the old reserved Italian gave him but a few minute's view" (Strange 16). Of all his architectural feats, one shall only focus on the rebuilding of London after the Great Fire of 1666, although all creations were proof of Wren's mathematical and geometrical mastering. One should bear in mind the conical steeples of temples rebuilt across the City, in order to better understand his awareness on the principles of Gravity and optical effects. The colossal Saint Paul's dome that stood as symbol of resilience amidst the dusty London skies during the 1940s *Blitzkrieg* is, indeed, Master Wren's ultimate (mathematical) masterpiece. Built between 1675 and 1710, Saint Peter's was England's first cathedral to have been built by a single architect, which was commendable when considering the lack of manpower available after the mortality rates of the Great Plague of 1665. Bernini's canopy at St. Peter's (the latter an architectural influence over St. Paul's) was to inspire Wren's own canopy,

which was later built in marble and gilt oak and placed at Saint Paul's main altar in 1958. Art historians keep on debating Wren's Classical and Baroque guidelines, seeking a simplistic classification over the cathedral's artistic features. However, one agrees with Joseph Levine's position that "whether the result is truly classical or baroque is perhaps besides the point [... for Wren] valued classical imitation, but needed freedom to accommodate his own buildings to the practical exigencies of time and place" (Levine 187-8).

Fig.5 St. Paul's canopy

Another reminder of the spot where the Fire of 1666 began is Robert Hooke's "The Monument". If at the lower level pedestrians may easily admire Caius Ciber's allegories of Charles II's victory over Evil and Envy (1669-1676), it is on top of the slender pharaonic obelisk one must focus the attention, at a safe optical distance. It was initially to be topped by a telescope that would serve scientific purposes, but the draughty confluence of the site offered no stability for the lenses to be set at 60,6 metres high and produce accurate data. In the end, the Sovereign would suggest a sun-like golden globe meant to be visually perceived from afar as Restoration London's symbol of urban renovation (cf. Carvalho 77-8). The truth of the matter is that in spite of the scientists who worked on the new capital city, Charles II's Baroque/exuberant wishes were always cut short by Parliament's financial restraints. What is most admirable is that by 1668 1.200 houses were already standing (Ackroyd 240). The rebuilding of the City benefited from the application of modern urban trends, in which concerns on traffic and navigation, paving methods, sanitation, and hygiene features were central, in addition to the creation of necessary harbour infrastructures, respecting a new understanding on the dynamics of a capital city and its growing connection to an overseas empire (mostly after the Anglo-Dutch Wars that ended in 1674 with England's commercial and naval domination over the Atlantic Ocean).

4. Charles II's Scientific Pursuits

Since an early age Charles II had been learning about Science. Besides, the secrets of the visible world fascinated him to the point of later attending meetings of the Royal Society as a means to learn directly with the Age's brightest minds. The Sovereign was also very fond of clock mechanisms and by the end of his life seven of these devices were to be found in the royal alcove on Whitehall Palace. He also ordered the setting of a sun dial and a telescope at the Privy Garden so that he could gaze at the skies (cf. Carvalho 4). The King even had a private laboratory at

the Palace, and one of the theories on his cause of death blames mercury poisoning for his demise (Fraser 585-6).

In historic and artistic terms, Charles II's reign is still marked by conflicting opinions on his political, religious, and aesthetic preferences. Ashley, for instance, speaks of twenty-five years of lurking political turmoil, though admitting the ruler had some skills his brother/heir James II lacked: "Charles was, on the whole, a successful politician, but he was certainly not a great statesman; and nearly everything he struggled for was destroyed during the reign of his successor" (326). Molloy too praises his management skills, regretting, however, the King's lack of concentration on serious matters:

> With the [...] courage he had shown in danger, the shrewdness and the wit he [...] evinced [...] Charles II might have made his reign illustrious, had not his love of ease and detestation of business rendered him indifference to all things so long as he was free to follow his desires. (Molloy 33-4)

Samuel Pepys believed the sovereign did not take his role seriously, for "instead of hard work, he settled into a life devoted to amusement and pleasure" (Tomalin 220). Kenyon, on the other hand, sustains that Charles II "was not a lazy man, but he lacked concentration, his interests were too diversified, and he did not apply himself to the business of governing" (Kenyon 211-2). Tim Harris defends that while the political analyst will admire Charles's governing skills, the historian will criticise the human cost derived from his innuendo (138). All in all, the King preserved the Stuarts' flaws: he knew little of Finance; he was a poor public speaker; and he disliked Parliament (under an invisible cloak meant to avoid direct confrontation, in exchange for negotiation). In spite of the dynasty's defeat at the Glorious Revolution, Time proved its kindness towards the memory of the "Merry Monarch". According to Ollard, two hundred years later, when questioned on whom of her predecessors would she invite for a gala dinner, (bleak) Queen Victoria chose no

one else but Charles II: "as the pendulum swung back from the strict decorum of the high Victorian age Charles II stood to gain" (Ollard 198).

Conclusion

Charles II was a man of pleasures, a King of compromise, and a patron of Knowledge whose life story was marked by shining lights and deep shadows. The 1st-born son of the King of England soon went from a lawful heir into a fugitive on the run, then from a claimant to the throne in exile into a saviour long-yearned by his country fellowmen. And though historians still criticise his ruling, the people keep on fancying him as the "Merry Monarch". In pragmatic terms, Charles II's Restoration was a period when ancient (religious and profane) traditions were revived as a means to provide the illusion of a return to political and socio-cultural stability. However, the world kept on turning and changing, and the main mutations were perceived in the fields of the Arts, Science, and commercial expansion. And, as Falkus sums up, attuned to the spirit of times, Charles II "led fashion, danced, was an enthusiastic sportsman and a regular theatregoer [... and] under his patronage all the arts flourished; and the sciences too" (2)

Though the Baroque style was not fully accomplished in architectural terms, it infiltrated itself in interior designs, decorative arts, and in the luxurious lifestyle of King and Court, yet in a less pompous manner than what was happening at *Versailles*. Though society still believed in omens, prophecies, incantations, amulets, holy springs, and divine preferences, Pre-Enlightenment characters strove to unveil the Universe's and Nature's secrets through the lenses of Reason. Though the Age of Discoveries had started in the 15th and 16th centuries under the leadership of the Iberian nations (Portugal and Spain), by the 17th century many territorial and commercial endeavours skip from Dutch into English hands. Ironically, British historians tend to overlook the importance of the marriage of Charles II to the Portuguese Princess Catherine of Braganza, and how her dowry granted England

two cities where European diplomacy and trade connections had been firmly rooted for over a century and a half. Indeed, Tangiers was a key city in the control of ancient Mediterranean trading routes, much like Bombay (present-day Mumbai) was for the East African and Asian (Indian and Sino-Japanese) commercial pathways.

[1] Much like it happened in Central Portugal to a specific holm oak after Our Lady of Fátima's apparitions in 1917.

[2] All the photos that illustrate this paper belong to the author, Cristina Carvalho.

[3] Reference to 2003 *The Da Vinci Code*.

[4] Latin translation for «Charles's Oak», located between the constellations of *Crux* and *Carina*.

Works Cited

Ackroyd, Peter. *London, the Biography*. London: Vintage, 2001.

Ashley, Maurice. *Charles II – The Man and the Statesman*. London: Weinfeld and Nicolson, 1971.

---. *The Age of Absolutism: 1648-1775*. Springfield, Massachusetts: G. & C. Merrian Company, 1974.

Bryant, Arthur. *Restoration England*. London: Collins, 1961.

Carvalho, Cristina. "Barroco e Absolutismo – Para um Itinerário do Reinado e da Corte de Charles II." Unpublished master's dissertation: Universidade Aberta de Lisboa, 2006.

Falkus, Christopher. *The Life and Times of Charles II*. London: Weidenfeld and Nicholson, 1992.

Fraser, Antonia. *King Charles II.* London: Phoenix, 2004 [1979].

Hamilton, Anthony. *Count Gramont at the Court of Charles II.* Org. Nicholas Deakin. London: Barrie and Rockliff, 1965.

Harris, Tim. *Restoration – Charles II and His Kingdoms, 1660-1685.* London: Penguin Books, 2005.

Hart-Davis, Adam. *What the Tudors & Stuarts did for us*. London: Boxtree, 2002 [1996].

Hook, Judith. *The Baroque Age in England*. London: Thames & Hudson Ltd, 1976.

Kenyon, J. P. *Stuart England*. Harmondsworth: Penguin Books, 2nd edn 1990.

Levine, Joseph M. *Between the Ancients and the Moderns – Baroque Culture in Restoration England*. New Haven, USA: Yale University Press, 1999.

MacLeod, Catherine and Julia Marciari Alexander. *Painted Ladies – Women at the Court of Charles II*. London: National Portrait Gallery, 2001.

Molloy, J. Fitzgerald. *Royalty Restored – London Under Charles II.* MacLean, Virginia: IndyPublishing.com, 2002.

Ogilby, John. *The Entertainment of His Most Excellent Majestie Charles II in His Passage through the City of London to His Coronation*. Org. Robert Knowles Binghamton, New York: Medieval & Renaissance Texts & Studies, 1988 [1662].

Ollard, Richard. *The Image of the King – Charles I and Charles II*. London: Phoenix Press, 2000.

Pearse, Maplas. *Stuart London*. London: Macdonald & Co., 1969.

Picard, Liza. *Restoration London.* London: Phoenix Press, 2002 [1997].

Strange, Thomas Arthur. *English Furniture Decoration Woodwork and Allied Arts*. London: B. T. Batsford Ltd., 1950.

Tomalin, Claire. *Samuel Pepys – The Unequalled Self*. London: Penguin Books, 2003.

Tomlin, Maurice. *Ham House.* London: The Victorian and Albert Museum, 1986.

Knowledge is Power. Francis Bacon's Theory of Ideology and Culture

Ensaio

Eugenio-Enrique Cortes-Ramirez | Universidad de Castilla (La Mancha, Spain)

1. Francis Bacon's Theory of Idols as the Concept of Ideology's Intellectual Precedent

Human beings have conceived ideas as weapons that help to fulfil our desires or interests, rather than the discovery of truth. Francis Bacon established that, when a man wishes something were true, the more he readily believes it, the more mankind commonly talks of the wish as being father to the thought (White 22). Thinkers have always been aware that there have been several obstacles that had impeded their knowledge of the world. Most of these obstacles are located in the human being's cognitive capacity itself. With the disintegration of medieval society, a new scientific approach to the knowledge of nature received impulse and began to supersede scholastic philosophy. In this way, theoretical contemplation of a hierarchical and sacred world was replaced by a conception that valued the practical function of thought. The development of trade, money exchange, secularised education, communities, cities, and so on, led to a new consideration of knowledge in its social and historical perspective (Houghton 48). An accurate and unprejudiced knowledge of nature is needed for it to be practically mastered, and this became the irresistible preoccupation of intellectuals. The new trends arise in opposition to the feudal system and its theological view of the world. The development of a precise knowledge of nature had been deeply limited, not just by some theocentric ideas such as the notion that human beings are essentially unable to conceive the world, but also by some artificial impediments that had prevented

Citação: Eugenio-Enrique Cortes-Ramirez, "Knowledge is Power. Francis Bacon's Theory of Ideology and Culture". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 25-42. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

it. The search for this accurate knowledge, together with the appearance of science, was the fight against all those factors that had been perturbing its development. Likewise, the conception of science is accompanied by a critique of former methods of cognition.

The first step to protect knowledge from these obstacles was the existential conscience of these irrational elements that suddenly arise in the mind and make it difficult to discover reality (Gaukroger, *The Emergence of Scientific Culture*, 182). Philosophers realised that there was a need to create a new approach to help eradicate those traditional distractions from the acquisition of true knowledge. Francis Bacon's *Novum Organum* (1620) and René Descartes' *Discourse de la méthode* (1637) were two such new approaches conceived under the need to search for a new methodology. The aim of this new method was based on the overthrown of the short-comings of Scholastic medieval thought. While Descartes remained at a more deductive level, Bacon insisted on the role of positive science and its observational character. He wanted to supersede Aristotle's *Organon* by a *New Organon* that no longer insisted on the deductive formal logic in the approach to reality but replaced it with an inductive approach (McRae 32). The Kingdom of the Human Being hence could only be erected on his knowledge of nature. Man acquired power over nature by obeying it, and he could obey it only after he had learned to understand it.

According to Bacon, there are four idols or false notions that could be obstructing human understanding and preventing it from discovering the truth. In fact, Bacon´s theory of idols has been placed in the destructive side of the *Novum Organum*. Its function was to discover whether the foundations of human power and greatness could be more secure as well as broadened. There are four categories of idols, these being the idols of the tribe, the idols of the cave, the idols of the market pace and the idols of the theatre. For Bacon, the first two are innate. These cannot be eradicated, only recognised in the process of cognition that is operated

spontaneously by them. In this operation human understanding resembles a mirror whose shape and curvatures change the rays of objects, distorting and disfiguring them. The foundations for this distortion are based on human nature itself. Therefore the idols of the tribe are closely linked to the human being. His character, education and general tendency are determined by the idols of the cave as the conceivers of his human idiosyncrasy (Farrington 29).

Among the Idols of the Tribe, the most important problem that had arisen in human knowledge acquisition is human nature as a filter. In fact, human nature acts as a filter that prevents knowledge from being perceived in analogy with the universe. This filter is made up of two elements of importance, these being superstition and the influence of human passions. Bacon had been deeply concerned with the corrupting effect of superstition upon science and philosophy. Superstition is the source of baneful deviation for scientific knowledge. Bacon considered that the scholastic confusion between philosophy and theology was especially damaging for science. He supported a clear split between religious knowledge and philosophy. So Machiavelli's concern with the social effects of religion was spread by Bacon from the field of political practice to the field of science (Larrain 20; Atkinson 39). The other element is the influence of human passions. According to Bacon, human understanding is not a dry light. It is determined by feelings and passions that corrupt it. For this reason, human knowledge cannot be reduced to its intellectual components because it is suffering from a negative effect not only by means of feelings and passions, but also by superstitions and religious representations (Mendelsohn 23).

The Idols of the Market Place are important for the concept of ideology in a different manner. Such idols arise in relation to language. Human beings learn linguistic signs even before their apprehension by means of experience. They barely need to reach experience through language, but due to superstition and passions sometimes language overwhelms truth and therefore experience. To prevent that,

human knowledge needs to create a corpus of ideas that links language to truth and, therefore, to experience and science. Bacon stated that the destiny of science was not only to enlarge human beings' knowledge but also to improve human beings' life on earth. Therefore, all human knowledge was the knowledge of ideas.

In turn, the Idols of Theatre arise from the authoritative and dogmatic character of traditional theories. Human beings tend to see the world through the eyes of former philosophical systems, full of dogmas and false rules that, like plays, create fictitious worlds. Bacon wanted to liberate knowledge from blind obedience to the opinion of former authorities. All experience which does not come from reason itself should be rejected. When idols operate, human beings apprehend *ex analogia hominis*. On the contrary, the true interpretation of nature should explain the world *ex analogia universi*. Human beings can only master nature by obeying its laws. To obtain this, a proper comprehension of them is required (Barth 48). For this reason, science must purge the mind of idols so that the truth can be achieved. Then science may appear as a reflection of reality unhindered by ancient prejudices, superstitions, feelings and passions. The corruption of philosophy could cease if the dichotomy cause-effect and the idea of superstition were explicated. In *The Proficiency and Advancement of Learning*, Superstition was ascribed by Bacon to the same influence that he had attributed to Idols in *Novum Organum*. Thus, he added Superstition to the Four Idols. Superstition was reprehensible for two reasons. First of all, Superstition had been the main factor why divinity had been overburdened by disgrace and outrage; and, second, Superstition had contributed to destroy the natural system of law and morality by subjecting the mind to an uncontrollable force. Superstition transferred the leadership and power of the state to the popular mass and, therefore, to popular culture. In these terms, Francis Bacon could also be said to have settled the basis on which popular culture has been established.

2. Puritanism, Reformation & Modern Science as the Basis for the Concept of Ideology

The rational discussion on which society must rely was sacrificed or adapted to the extent that not only had Superstition appropriated the power of the state, but had also destroyed freedom of conscience and established uniformity of opinion in society (Henry 112). Reflecting the need for the creation of a rational basis in either the doctrines of revelation or the rational understanding of nature, Superstition destroyed the supernatural and the natural order, surrendering both to human impulse. Regarding Superstition, its connection with the French Enlightenment is based on the later view that idols in the state and in science were identical. Moreover, Bacon considered the social interests of the clergy as of decisive importance. As in the concept of Ideology, he discovered that certain religious customs, institutions and ideas no longer reflected "true" religion but served the interest of certain social estates; the criticism of the idols and superstition was transformed into social criticism.

The clergy's interests were supported first by the Reign of Charles I and second, by the Government of the Saints that was led by Lord Protector Oliver Cromwell in the Commonwealth of England, Scotland and Ireland (1649 – 1660). Charles I permitted his Archbishop of Canterbury, William Laud, to push for Anglo-Catholic liturgical conformity (Trevor-Roper 182). He married a Catholic queen, persecuted the Protestants and imposed on Scotland an English-style prayer book and Episcopal system. As a reaction against Charles I's pro-Catholic political position, the English Revolution was the first modern attempt to reorder the political affairs of an entire nation while at the same time reforming the consciousness of its citizens. John Milton, the official propagandist for Cromwell´s revolutionary Protectorate, was compelled to enlist ancient and medieval ideas in the service of political innovation, just as Machiavelli had done in Renaissance Florence (Hill, *Milton and the English Revolution*, 82). The construction of the

utopian movement was to create the scientific/industrial transformation of the natural world. In England's Protectorate, this reform was accompanied by an emphasis upon the practical implications of the new learning and the ways through which knowledge could be used for charitable purposes. Bacon's writings would play a central role in the English reformers' educational schedules. Therefore, the critique of religion was expanded into a critique of the state when, on the one hand, the interests of the leading group in this state had coincided in some aspects with those of the clergy, and, on the other, the social hierarchy and the political constitution had been sanctioned by religion. A state that had been founded on religion was bound to regard any criticism of clergy and religion as aimed against its own establishment and therefore turned its instruments of power to their defence (Whitney 106). The separation of theology and philosophy had had for Francis Bacon certain consequences regarding the relationship between the Church of England and the English State. Although he had regarded the unity of religious faith as useful and desirable for the state, he had refused all compulsion in matters of conscience for two reasons. First, throughout History, the passions and interests of specific parties have been too easily inflamed by religious compulsion. And, second, compulsion had reduced the importance accorded to scientific subtlety and accuracy (Mannheim 48).

In his struggle against everything that had obstructed the introduction of a rational order in human relations and in knowledge, Bacon had only expected his theory of idols to act as a safeguard for the understanding and explanation of nature. In fact he had to confront two problems. On the one hand, he had to discover the causes which prevented human beings from ordering their lives according to reason and nature. And, on the other, he had to identify the source of the obstructions which impeded the advancement of knowledge (Weinberger 93).

The Puritanical era forced itself upon England during the Protectorate of Oliver Cromwell. Even theatres were closed. Like most revolutions from above, the

Commonwealth that had been created by Cromwell soon foundered due to popular conservatism, and the monarchy was finally restored in 1660 (Mulligan 101). Through Puritanism, the Government of the Saints had transformed religion into a universal moral faith which led them to advance their demands with the passion of secular missionaries. Faith in Human Beings' ability to discover the immanent laws of nature, that were equivalent to the laws of reason, was beyond doubt. Regarding this, Christopher Hill supported the Weber-Tawney-Merton hypothesis concerning the interrelated rise of Puritanism, Capitalism and Modern Science (Hill, *Puritanism and Revolution*; Webster 253). Furthermore, this faith did not prevent them from recognising that the current use of human beings' reason was severely impeded and at times rendered completely ineffectual. They were equally certain that the natural, rational order was as yet nowhere realised. Although the aim of establishing a rational order was to be abandoned at the start, the nature of the obstruction had to be known. If the mind was like a mirror that distorts the rays of objects, surely the intellect was constitutionally unsuited for the comprehension of nature. None the less, Bacon was clear enough in the sense that science could reach the truth despite the action of idols. This first indicated that for him there was no logical necessity for the operation of idols and that, using the right method, human beings could eradicate them. The mere recognition of the existence of idols was already a way of rendering them harmless. But the true and immanent problem was how to understand and reconcile the intervention of innate idols and that of external idols. The difficulty regarded the concept of ideology (Fulton 306).

Hence, the dilemma that beset the construction of this concept was already implicitly posed by Francis Bacon. Ideology could be conceived either as an aftermath whose roots were based on human beings' social relations, or as an aftermath whose origins derived from the universal presence of irrational and emotive elements, those which were inherent to human nature, that recurrently assailed and perturbed science (Hall, "The Early Years of the Royal Society", 265-

268). The first possibility emphasised the social determination of ideology, whereas the second pointed to the opposition to science. These two options were necessarily contradictory. Bacon was interested in the Idols of the Market Place only in so far as they had also constituted an obstacle to science. The important difference he had contemplated was that while the innate idols could be logically dealt with at the level of the human condition, the idols dependent upon human intercourse could not be easily eliminated without modifying that relation. The reference to innate idols truly emphasised the opposition to science, when in fact the reference to a social liaison rather tended to the revision of material situations. Bacon had even sharpened an accurate distinction between innovations that had affected the intellectual and institutional bases of civil society and those which had basically remodelled the logical foundations of knowledge. The theory of idols that had been expanded into a theory of prejudice at the time had acquired a pronounced political character. Prejudices had concealed this character from common view. Therefore, Francis Bacon had advocated replacing a social order that had been based on divine authority and sovereignty with a secular order which has been justified by reason. At this point, the critique of Enlightenment commenced from Bacon's position (Archer 112). The irrational basis of the state and religion, which had already admitted by Bacon, was then perceived as another idol to be put on trial before the court of reason. If this did not succeed, this new idol would be revealed as the result of the conspiracy of class interest and group volition (Dzelzainis 144).

Bacon did not question the links between the two kinds of idols, nor did he foresee the difficulty in dealing with idols that were created in social relations by means of an intellectual exercise. His main fixation was how to protect rational knowledge from any unreasonable incursion. The supposition was implicitly established that this could be done at the level of knowledge itself, even for the idols of the market place. For this reason, Bacon distinguished progress in science

from changes in civil society. While the former is appreciated, the latter are frightening. He insisted on the opposition between idols and science. This opposition to science was more highlighted than its social equivalent that was the seed of the concept of ideology.

At this point, the critique of the Enlightenment started from Francis Bacon's position. This critique established that the existence of a natural, lawful order of state and society could be disclosed. If this order did not exist at the time, the reason simply was that prejudices had concealed it from common view. Bacon's idols were considered as prejudices by French philosophers like Étienne Bonnot de Condillac, Paul Henri Thiry d'Holbach and Claude-Adrian Helvetius and had acquired a more pronounced political dimension. This new political vision claimed to replace a social order which had been founded on divine authority and sovereignty with a secular order that had been justified by reason. The irrational basis of the state and religion in Cromwell's Government of Saints, which Bacon, in his own time, had already admitted to regarding the state in general, was perceived as one more idol to be brought before the auspices of reason. If this idol did not work, this would be exposed as the machination of class interest and group will. Purging the mind of idols was the first step to impartiality, liberating thought from preconceived ideas and prejudices.

When monarchy was restored in England, social life came back to pre-Protectorate social, not political order. Places of entertainment and theatres were reopened. Under Charles II scientific analysis became associated with the newly opened musical houses under the watchful eye of the Royal Society established in 1662 by King Charles himself. This was an innovative stage in the English theatre as King Charles blended science and drama to create a much greater interest in the theatre by a wider audience. An example of this was Francis Bacon's interest in acoustics and the development of strategies to identify the ambiguous nature of consonance, which he believed was not simply a matter of numerical ratios and

musical effect, but could be understood through experimentation with musical instruments (Gouk 239). This assumption was the first step towards entering the scientific dawn of the seventeenth century. Francis Bacon was the first to understand the importance of experiments as a means of advancing all branches of scientific knowledge. He began in the *Advancement of Learning* by enunciating the general principles of the experimental method. Thus Bacon appreciated that facts obtained from experiments would have little significance unless they were correlated, and that their proper interpretation was one of the chief aims of science. But Bacon's insight did not end here. He realized that the scientist would require protection, and that progress could be made only through cooperation and organization. A society must be formed which would have its own laboratories and scientific equipment with special facilities, such as caves for the study of subterranean phenomena, high towers for meteorological observations, experimental stations for the study of fauna and flora, special rooms for the analysis of heat, sound, and the transmission of light, which has probably never been realized in any one institution. The Royal Society of London, therefore, found its analogue in *Solomon's House*, the fictional institution in Francis Bacon´s *New Atlantis* (Martin 29). This idea had inspired some Bacon's followers such as Samuel Hartlib and his circle and Robert Boyle. The *New Atlantis* appears to have been written around 1617, and its importance lies not in what it proved, but in having suggested and pointed the way to any kind of organized scientific attempt. In order to protect experiments from idols, through empirical method, Bacon tried to designate a philosophical discipline that was to provide the foundation for all the sciences. In other words, he understood the existence of this discipline, a science of ideas, but he could not designate it. This designation finally took place in France at the time of the Revolution. There, the word *idéologie* was first introduced by a philosopher, Antoine Louis Claude Destutt de Tracy, as a short name for what he called the science of ideas, which he said he had adapted from the epistemology of

the philosophers John Locke and Étienne Bonnot de Condillac, for whom all human knowledge was the knowledge of ideas (Kennedy 357).

3. Conclusions

This return to Francis Bacon's early conception was due to reveal the true mission of ideology. Interest could damage science, turning judgements into prejudices. Ideology works here as a part of objectivity, bowing to what is advantageous. The excellent achievements of the human intellect have sometimes been obtained by those scholars who usually worked alone, but the caution of some academic institutions was an obscure atmosphere that only a few, if any, could envisage. Throughout History, the constant advance of scientific progress, nevertheless, has depended not so much upon individuals as upon groups who had collaborated with one another in the quest of a common purpose. Francis Bacon admitted this, but this recognition by universities was remarkably procrastinated. The fact was that the scientific community's reaction against universities' conservatism generated the founding of the great scientific societies in the seventeenth century. As stated, on 15th July 1662, King Charles II issued a decree that officially recognized the assembly of these scientists as a society and named it *The Royal Society*. Despite not having been officially born until 1662, the Royal Society of London originated as early as 1645. Notwithstanding, the first organized scientific academy appeared in Florence, this being the *Accademia del Cimento*, founded in 1657, which existed for ten years. Its name, the Academy of Experiment, was well chosen by Galileo Galilei who was also its spiritual father. Even his disciples Evangelista Torricelli and Vincenzo Viviani were its most distinguished members. This institution soon vanished, and, when it collapsed, Italy's high position in science was replaced by England. The Royal Society of London has been the most intensively examined of the seventeenth-century scientific academies. It has been representative of particular social and ideological movements in Restoration England (McKie 14).

Five years after its foundation, in 1667, the first *History of The Royal Society of London* was published by Bishop Thomas Sprat (Wood 20). In this document, Francis Bacon was considered as the chief inspirer of the founders. Under the motto *Nullius in Verba*, Bacon was said to have conceived The Royal Society of London as an institution which had been created 'To the honourable society for the advancement of experimental philosophy', where his ideas were transformed into actions (Syfret 84; Hoppen 19; Dear 154). This full transformation in the founding of the Royal Society after the Restoration of 1660 represented Francis Bacon's deification as a philosopher, and the final victory of his project of collaboration, utility and progress (Pérez-Ramos 132). Bacon laid the groundwork for modern science by means of a distinction between the knowledge that had been derived from the unquestioned authority of the Ancients and of Scholastic Philosophy, and the knowledge that had been gained through rigorous, empirical observation. The place of experience in the *New Philosophy* played a crucial part in this process. First, because the idea of experiment and observation played an important role in the Scientific Revolution generally and in the Royal Society in particular; and, second, because polemical anti-scholastic writings of the period opposed experience to an alleged reliance on ancient authority. Like Bacon's idols, some of these obstacles to true perception are produced by the internal working of the mind, while others are imposed by external forces. This had been represented by John Locke´s division of experience into two categories, these being reflection and sensation. On the one hand, experiences that had taken place outside of human beings could be appreciated by the intellect and, on the other, the inner operation of the human mind could also be experienced. The former experiences had been named as the sensual or material dimension of external encounters by John Locke, that is, those which had been contemplated as distinct from the ideal dimension of these kinds of experiences. These two experiences had raised the two main questions that ruled the establishment of the intellectual basis for the creation of ideology (Hill, *Intellectual Origins*).

The Royal Academy also wanted to provoke an impulse towards science and philosophy. But the true revolution that had been envisaged by its members, from its first president Christopher Wren to its first secretaries Henry Oldenburg and John Wilkins, was a gradual, Baconian process of education, where the idols would have tactfully been removed and reason would be installed in its place so that knowledge could be produced. To designate knowledge as ideology, and consequently as an entity that is bound to power, a relation between the product of thought and the social situation of the thinking topic made this designation an important one. The aim then was to design a file where those conditions were compiled in order to defend the objectivity of knowledge against prejudices. Definitely, power changes hands, but in so local and arbitrary a manner that in the end only power remains. By explaining away the existence of authentically new ideological formations or modes of thought, Francis Bacon issued this warning against the increasing dominance of historical revisionism in the time of King James I (Hall et al, "The Intellectual Origins of the Royal Society", 161; Rattansi 136; Woolf 78).

In the twentieth century, Christopher Hill complained about a similar effect that had taken place in the mid-seventies regarding the conflict that had been raised between historical revisionists and new historicists, thus effectively regarding history as "just one damned thing after another": a force without real agents, ideals or goals. Notwithstanding, as Hill accurately contemplated, this position on history has remained attractive for obvious sociological reasons, including the failure of the great political and social revolutions of the early twentieth century (Hill, *Puritanism and Revolution*; Lake xii). These reasons also went far toward explaining the coined paradigm which was explained by Stephen Greenblatt's "subversion and containment" model of early modern culture in the aftermath of the failed cultural revolution of the 1960s (Greenblatt 72). Although Marx and Freud had obviously offered wide models of liberation, they were associated here simply because late Marxists such as Louis Althusser, Christopher Hill and his friend and fellow scholar

Norman O. Brown had commonly done so. To expound the ideological liability of human knowledge, the primary question is not whether wisdom is objective and related to an object and to an idea. This question would be based on the kind of conditions under which knowledge is formed. This question brought to light the dependence of historical and social knowledge on a multitude of non-theoretical conditions that, nevertheless, had indisputably exerted an influence on theorising and its results. The aim then was to design a treaty of these conditions in order to secure the objectivity of understanding against possible sources of error. In this sense, the theory of ideology appeared as a continuation of Francis Bacon's Theory of Idols. Every social group or stratum possessed a definite ideological corpus linked to its own material reality. This theory has been followed by John Locke and David Hume, Voltaire and Laplace. Since Arthur Schopenhauer and Auguste Comte, there has been a wide range of responses (Rodríguez-García 119). This range has been represented, since Francis Bacon's Theory, by a confluence of relevant ideas from, among others, Dilthey, Spengler, Marx and Nietzsche (Lampert 61). At the same time, this impulse culminated in the contention that all kinds of thought have been inevitably determined by the cultural and economic position of the thinking subject. This consideration has been taken over in the work of British Marxists such as Raymond Williams as well as in the even more influential accounts of ideological containment developed by Louis Althusser and Michel Foucault. This tradition that was established by Francis Bacon had been opened by philosopher and physician Francisco Sanches. He established that, if scientific knowledge is sought, science ought to refrain from the methods, summaries and commentaries on Aristotle. Bacon's Theory of Idols has had its place in this "destructive" part of the *Novum Organum*. Following Sanches' statements, this "destruction" is referred by Bacon as those methods of judgment and experience which are mistaken when in the wrong hands. In order to prevent mankind from this "destruction", Ideology was born to

protect and to promote learning, knowledge and truth through experiment and induction bound to truth. In Francis Bacon's words,

> There are and can be two ways of searching into and discovering truth. The one flies from the sense and particulars to the most general axioms, and from these principles, the truth of which it takes for settled and immovable, proceeds to judgement and to the discovery of middle axioms. And this way is now in fashion. The other derives axioms from senses and particulars, rising by a gradual and unbroken ascent, so that it arrives at the most general axioms last at all. This is the true way, but as yet untried. (Bacon 1879: 56)

Thanks to Bacon, action has been subordinated to science and progress to knowledge. And Knowledge is power because it reaches the boundaries of possibility and truth with the protection of ideology.

Works Cited

Archer, John Michael. "Surveillance and Enlightenment in Bacon's New Atlantis." *Assay 6* (1991): 111-2.

Atkinson, Dwight. *Scientific Discourse in Socio Historical Context: the Philosophical Transactions of the Royal Society of London, 1675-1975*. London: Routledge, 1998.

Bacon, Francis, *The Works of Francis Bacon*. Ed. James Spedding, R. L. Ellis, and D. D. Heath. N.p.: Longon, 1879.

Barth, Hans. *Truth & Ideology*. Berkeley, CA: U of California P, 1976.

Dear, Peter. "Totius in Verba: Rhetoric and Authority in the Early Royal Society." *Isis* 76.2 (1985): 145-161.

Dzelzainis, Martin. "The Feminine part of every Rebellion: Francis Bacon on Sedition and Libel, and the Beginning of Ideology." *Huntington Library Quarterly* 69.1 (2006): 139-152.

Farrington, Benjamin. *The Philosophy of Francis Bacon. An Essay on its Development from 1603 to 1609*. Liverpool: Liverpool UP, 1974.

Fulton, John F. "The Rise of the Experimental Method: Bacon and the Royal Society of London." *The Yale Journal of Biology and Medicine* 3.4 (1931): 299-320.

Gaukroger, Stephen. *The Emergence of Scientific Culture, 1210 – 1685*. Oxford: Oxford UP, 2006.

---. *Francis Bacon and the Transformation of Early-Modern Philosophy*. Cambridge: Cambridge UP, 2001.

Gouk, Penelope. "The Role of Harmonics in the Scientific Revolution." *The Cambridge History of Western Music Theory*. Ed. Thomas Christensen. Cambridge: Cambridge UP, 2002. 223-45.

Greenblatt, Stephen, and Catherine Gallagher. *Practicing New Historicism*. Chicago: U of Chicago P, 2000.

Hall, Marie Boas. "The Early Years of the Royal Society." *Notes and Records of the Royal Society of London* 44.2 (1990): 265-268.

---, et al. "The Intellectual Origins of the Royal Society. London and Oxford." *Notes and Records of the Royal Society of London* 23.2 (1968): 157-168.

Henry, John. *Knowledge is Power: Francis Bacon and the Method of Science*. London: Icon Books, 2002.

Hill, Christopher. *Milton and the English Revolution*. London: Faber Paperback, 1979.

---. *Puritanism and Revolution: Studies in Interpretation of the English Revolution of the 17th Century*. London: Pimlico, 1994 [1958].

---. *Intellectual Origins of the English Revolution*. Oxford: Oxford UP, 1997 [1965].

Hoppen, Karl Theodore. "The Nature of the Early Royal Society." *British Journal for the History of Science* 9 (1976): 1-24.

Houghton, W. E. "The History of Trades: Its Relation to Seventeenth-Century Thought: As Seen in Bacon, Petty, Evelyn, and Boyle." *Journal of the History of Ideas* 2.1 (1941): 33-60.

Kennedy, Emmet. "'Ideology' from Destutt De Tracy to Marx." *Journal of the History of Ideas* 40.3 (1979): 353-368.

Lake, Peter. New Introduction. *The Holy Spirit and Puritan Faith and Experience.* By Geoffrey F. Nuttal. Chicago: U of Chicago P, 1992 [1947]. ix – xxv.

Lampert, Laurence. *Nietzsche and Modern Times: A Study of Bacon, Descartes, and Nietzsche*. New Haven: Yale UP, 1993.

Larrain, Jorge. *The Concept of Ideology*. London: Hutchinson University Library, 1979.

Lewis, Rhodri. *Language, Mind and Nature: Artificial Languages in England from Bacon to Locke*. Cambridge: Cambridge UP, 2007.

Mannheim, Karl. *Ideology and Utopia: An Introduction to the Sociology of Knowledge*. Ed. Louis Wirth and Edward Skils. New York: Harcourt Brace, 1985.

Martin, Catherine Gimelli. "The Ahistoricism of the New Historicism." *Knowledge as Power Versus Power as Knowledge in Bacon's New Atlantis. Fault Lines and Controversies in the Study of Seventeenth Century English Literature*. Ed. Claude H. Summers and others. Columbia: U of Missouri P, 2002. 22 – 50.

McKie, Douglas. "The Origins and Foundation of the Royal Society of London." *Notes and Records of the Royal Society of London* 15.1 (1960): 1-37.

McRae, Robert. "The Unity of the Sciences: Bacon, Descartes, and Leibniz." *Journal of the History of Ideas* 18.1 (1957): 27-48.

Mendelsohn, Everett. "The Social Construction of Scientific Knowledge." *The social production of scientific knowledge*. Ed. Everett Mendelsohn et al. Netherlands: Springer, 1977. 3-26.

Mulligan, Lotte. "Civil War Politics, Religion and the Royal Society." *Past & Present* 59 (1973): 92-116.

Pérez-Ramos, Antonio. "Francis Bacon and Man's Two-Faced Kingdom." *Routledge History of Philosophy 4, The Renaissance and 17th Century Rationalism*. Ed. G. H. R. Parkinson and S. G. Shanker. London: Routledge, 2003. 130 - 155.

Rattansi, Pyarali M. "The Intellectual Origins of the Royal Society." *Notes and Records of the Royal Society of London* 23.2 (1968): 129-143.

Rodríguez-García, José-María. "Scientia Potestas Est – Knowledge is Power: Francis Bacon to Michel Foucault." *Neohelicon* 28.1 (2001): 109-121.

Shapin, Steven. "The mind is its own place: Science and Solitude in Seventeenth-Century England." *Science in Context* 4.1 (1991): 191-218.

Snider, Alvin. *Origin and Authority in Seventeenth-Century England: Bacon, Milton, Butler*. Toronto: U of Toronto P, 1994.

Solomon, Julie Robin. *Objectivity in the Making: Francis Bacon and the Politics of Inquiry*. Baltimore and London: Johns Hopkins UP, 1998.

Summers, Claude J. and Ted-Larry Pebworth. *Fault Lines and Controversies in the Study of Seventeenth-Century English Literature*. Columbia, MO: U of Missouri P, 2002.

Syfret, R. H. "The Origins of the Royal Society." *Notes and Records of the Royal Society of London* 5.2 (1948): 75-137.

Trevor-Roper, Hugh Redwald. *The Crisis of Seventeenth Century. Religion, the Reformation and Social Change*. London: McMillan, 1972.

Webster, Charles, ed. *The Intellectual Revolution of the Seventeenth Century*. London: Kegan Paul, 1974.

Weinberger, Jerry. *Science, Faith and Politics: Francis Bacon and the Utopian Roots of the Modern Age*. Ithaca: Cornell UP, 1985.

White, Fred D. *Science and the Human Spirit: Contexts for Writing and Learning*. Belmont, CA: Wadsworth Pub., 1989.

Whitney, Charles. *Francis Bacon and Modernity*. New Haven: Yale UP, 1986.

Wood, Paul B. "Methodology and Apologetics: Thomas Sprat's History of the Royal Society." *The British Journal for the History of Science* 13.1 (1980): 1-26.

Woolf, D. R. *The Idea of History in Early Stuart England: Erudition, Ideology, and "The Light of Truth" from the Accession of James I to the Civil War*. Toronto: U of Toronto P, 1990.

The Value of Science in John Rastell's play *Four Elements* (c.1518)

Olena Lilova | Classic Private University (Zaporizhia, Ukraine)

Thomas More's contemporary and close companion, John Rastell (?1475-1536) was born in Coventry, famous for the medieval mystery processions that were an important part of local festivities and special events. It was obviously there, at his native place, that Rastell first felt a liking for drama that he developed later on, during his life in the English capital. The playwright's London period was the time when all his versatile talents burgeoned, making him one of the most outstanding English humanists of that epoch. He made a figure in the social and cultural life of the country. However, his engagement with persons endowed with power made his participation in their political enterprises quite risky.

John Rastell became a relative of More's by marrying his sister Elizabeth. One of Rastell's sons, William, proceeded with his father's printing business during 1530-1534, while John inherited from his parent an ardent inclination for far sea voyages.

Loyalty to the ideas of the Reformation did not save John Rastell from the king's disfavour. He died in prison in June 1536, where he was sent to for disobeying the royal decision about the dispute concerning Rastell's ownership of the lands that had been granted to him for his service in the 1510s.

J. Rastell was a man of diverse interests. His achievements in different fields of professional activity prove that he was a gifted person, apt to learn. Following in his father's footsteps John Rastell studied law at the Inns of Court in London and became a renowned lawyer. In the years 1506-1509 he took the position of coroner in Coventry and headed the Court of Statute Merchants, just like his father did several years before him.

Citação: Olena Lilova, "The Value of Science in John Rastell's Play *Four Elements* (c.1518)". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 43-57. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

Around 1510, J. Rastell's printing business launched a publishing house, and a shop opened in one of the premises not far from St Paul's Cathedral in London. *The Life of Pico della Mirandola* by Thomas More was the first book published by Rastell's company. His next projects were even more ambitious. They include the first English Dictionary of Law terms, a Books of Statutes, a Record of the Court Proceedings that involved the interests of the royal family, a number of text-books in Law, used by several generations of English students, and many others.

It was at J. Rastell's publishing house that the works of the English early Tudor playwrights John Skelton, Henry Medwall and John Heywood were published for the first time. In this way, the plays passed the borderline from "ephemeral" oral existence to the form of the printed text (Axton 3), which made them accessible for a wider reading audience. J. Rastell's choice of dramatic works for publication was neither accidental nor spontaneous. Inspired by the faith in the instructive power of the printed word Rastell preferred those texts that correlated with his ideals and conveyed his civil position.[1] The English humanist found his mission in placing into the foundation of the social order the principles of rationalism and justice. And spreading ideas throughout the community was to help in achieving this goal.

John Rastell himself had to learn different sciences to do various jobs during his eventful life. While in the service of Henry VIII's privy councillor Sir Edward Bellknap, he was responsible for the transportation of English artillery and other heavy equipment in the war with France in the years 1512-1514. Several years later Rastell got greatly interested in overseas voyage. It cost him much time and effort to become professionally trained in sailing. According to John Rastell's biographers,[2] in 1517 as the master of the chartered ship "Barbara" he started a risky trade expedition to the New World. The whole enterprise, however, proved to be a failure, which is why it did not last long and the ship did not get farther than Ireland. Still it was not totally worthless. Rastell made use of the knowledge he acquired during the preparation process in his work on the interlude *Four Elements* (Axton 6).

During his multi-faceted professional life J. Rastell had a chance to develop his engineering skills as well. The royal court charged him with managing some construction projects, like roof building and decoration works on the ceilings of great banquet halls (Axton 7). Rastell's passion for the theatre might have helped him in 1522 to get an order from the London city treasury according to which he was to erect a pageant close to St Paul's on the occasion of the two monarchs' (the Emperor Charles V and the King Henry VIII) visit to the Cathedral. As Rastell's contemporaries observe, the pageant decorations representing Eden with trees, flowers and herbs, silver streams and forested mountains, stars and angels, looked a true masterpiece of mechanics (Axton 7). It wasn't the only case of J. Rastell's participation in royal theatre presentations. In the summer of 1527 he carried out the staging of the pageant *The Father of Heaven* to entertain the French ambassadors. The decorations for this pageant were erected not on the traditional moving platform but within doors of a small banquet hall. Its ceiling was painted with stars and constellations, looking like an astrological map, while the floor represented the Earth surrounded with seas (Axton 8). The dialogue of *Love and Riches* was composed by Rastell on the same occasion.

Rastell's experience and skills in engineering probably came in useful when his own house was being built in Finsbury Fields in London (the works began in 1524). It is noteworthy that besides all other things the house was equipped with a stage for home performances, which appears to be in accordance with Rastell's lifelong passion for the theatre. This love for dramatic presentations was probably shared by all the household members. It is known that Mrs Rastell and the maids used to sew costumes for the indoor plays. Those costumes were famous enough among Melpomene servants and even used to be hired by other household theatres in London. The loss of the costumes due to Henry Walton's inadvertency led to a law suit brought by Rastell against him (Axton 7). This serious attitude towards a cherished hobby contributed to maintaining the high reputation of this wardrobe;

garments and other stage properties located at J. Rastell's place helped out many early Tudor performers (Wilson 23).

The 1520s turned out to be a truly prolific period in J. Rastell's publishing business. For historians of English drama, the collection of three plays (*Four Elements*, *Calisto and Melebea*, *Gentleness and Nobility*) published by John Rastell is of special interest. The first play in the volume is believed to be one of J. Rastell's works while the authorship of the other two pieces is more ambiguous. Besides drama, the second decade of the sixteenth century was also marked by the republication of Dictionaries and Collections of Law documents as well as the publication of such books as *A Hundred Merry Tales*, *Book of a Hundred Riddles*, *Twelve Merry Jests of widow Edyth*, the lost play *Christmas or Good Order*, the treatise *The Boke of Purgatory*, the large illustrated edition of the history of entertainment entitled *The Pastime of People*, and others.

As was mentioned above, the play *The Nature of the Four Elements* is traditionally attributed to John Rastell himself. Some scholars assume that J. Rastell might also be the author of the interlude *Gentleness and Nobility*, which was included in the same volume. To prove this assumption F. S. Boas refers to the obvious similarity of ideas and the form of their presentation in Rastell's *The Boke of Purgatory* and *The Pastime of People*, on the one hand, and the play *Gentleness and Nobility*, on the other hand. Boas observes that these ideas were highly progressive for Rastell's time, such as, for instance, the belief that judges and other law officials that occupied positions of extraordinary responsibility were to fulfil their functions only for a short term of several years, after which they were to be deposed. This idea appears both in the play and in *The Pastime of People*. As for *The Boke of Purgatory*, it too has some ideas in common with the play. F. S. Boas, for instance, refers to the thought that a man should be ruled in life by his natural rationality and not by the prescriptions of the Bible (Boas 7-8).

The play entitled *A New Interlude and a Merry of the Nature of the Four Elements*, of which only one half is preserved, is considered to have been written in 1518 (Axton 7). The play actually presents the exhortation for a man to study that Rastell not only actively propagated all his life, doing every possible thing to spread knowledge among his contemporaries, but which he himself made the basic principle of his professional activity. The allegorical characters that conduct the idea of the significance of learning in *Four Elements* are Nature, Studious Desire and Experience. They are opposed to Sensual Appetite and Ignorance, with Humanity as the play's central character. So, as one sees, the dramatic structure of Rastell's *Four Elements* is typical for the morality play, i.e. it represents two opposite forces – usually the embodiment of good and evil – that struggle for their influence upon the character that personifies mankind.

It is only to be expected that Natura Naturata is made the central virtue figure in Rastell's play, thus taking the place of the moral virtues that played this role in medieval drama. As a teacher of Humanyte, Natura Naturata charges her subordinates –Studyous Desire and Experience – with the task of instructing the student. Thus he is delivered lessons in Physics and Geography; he gets an idea of the Earth's rotundity, of the distance from England to Jerusalem, of life across the ocean and so on, until the opponents of learning interfere into the planned course of events. Negative allegoric characters are an indispensable part of any medieval morality play. They provide the performance with action, eventfulness, making it essentially dramatic, while the play of positive characters is usually limited to their verbal presentations. In such a way the conflict, necessary for the development of the dramatic situation, is brought in by the forces of vice.

Besides that, the plot pattern of *Four Elements* is archetypical enough, too, and it was certainly well known to early Tudor audiences. The play starts with Nature and other virtue figures admonishing Humanity and advising him on the path of good; then temptation follows with evil and we consequently see

Humanity's moral breakdown, which is followed by the central character's acknowledgement of his guilt and his repentance at the end.

In this way, the main dramatic device that guarantees the conflict development in the morality play is the alternation of episodes with positive and negative characters. This very structure can be observed in J. Rastell's play. In *Four Elements* one sees the alternation of serious material rendered by Nature (in a lecture in Physics), Studious Desire (in a lecture in Geography), and Experience (a talk about travelling to distant lands, a discussion about the shape of the Earth), with entertaining scenes in which Humanity enjoys the merry revellers' company. In these episodes the allegorical figures of Sensual Appetite and Ignorance are joined by the Taverner. As to Humanity, he succumbs to such temptations as delicious food and drinks, women, dancing, singing and recreation in a merry company.

At the same time, despite all the traditional features of the morality mentioned above, J. Rastell's play obviously belongs to the drama of the transitional type. Its message as well as the way the major characters are treated make *Four Elements* stand out from the traditional genre framework. These poetical elements of the play need further detailed investigation.

As to the play's message, it is indeed humanistic in its essence. The playwright's belief in the necessity of education, the topicality of the propensity to learn, the importance of disseminating knowledge about the world are conveyed by the characters that represent good in *Four Elements*. For instance, in the first lecture that is delivered by Nature it is stated that the thirst for learning must be characteristic of man, as he is endowed with intelligence and thus takes the dominant position in the natural hierarchy (Rastell ll.211-12).[3] In this very lecture Nature tells Humanity about four elements that are primordial: "These elements of them selfe so single be / Unto dyvers formys can not be devydyd, / Yet they commix togyder dayly ye see, / Wherof dyvers kyndes of thyngys be ingenderyd…" (ll.176-79). That is why, in Nature's opinion, the first thing that Humanity must learn is the

qualities of water, air, fire and earth. After that, Nature passes to the explanation of such natural phenomena as clouds, mist, hail, snow, rain, etc (ll.225-80). The first lecture being over, Nature's place is taken by Studious Desire, who dwells upon the shape of the Earth, arguing that it is round. The lecturer's arguments do not seem to be convincing enough for Humanity, which is why Studious Desire invites Experience to talk to the student and discuss this disputable question with him.

In this way, from the very beginning of the play it is made clear that the two main fields of knowledge that will be under discussion in *Four Elements* are natural philosophy and cosmology. This can probably be explained by the general interest in these sciences that was typical of a Renaissance man. Besides, the playwright's biographical context might also have determined his choice of the play's subject matter. As was mentioned above, in 1517 Rastell was getting prepared to carry out a sea voyage to America that proved to be a failure. His resentment at the accomplices who deceived his expectations and set up the crew against both the head of the expedition and the venture itself is conveyed in the monologue of Experience. This character informs Humanity of a distant and vast land that can be found after sailing across the ocean. A lot of his countrymen have already travelled there but not all of them were successful. Then Experience recalls a recent inglorious expedition, making the venturers responsible for the abandonment of the voyage: "But they that were the ventures / Have cause to curse their maryners, / Fals of promys and dissemblers, / That falsy them betrayed, / Whiche wolde take no paine to saile farther / Than their owne lyst and pleasure / Wherfore that vyage and dyvers other / Such kaytyffes have distroyed" (ll.758-65).

Rastell makes use of Experience's remarks to relay his knowledge of natural philosophy and cosmology. Besides the already mentioned discussion on the shape of the Earth, the playwright tackles such questions as America's natural resources, aborigines' lifestyle, continents and regions of the Earth that have not yet been studied enough, etc. As it is, talking about residents of the North American

continent Experience mentions their paganism and emphasizes the Christians' educational mission in the newly discovered land: "And what a great meritoryouse dede / It were to have the people instructed / To lyve more yertuously… But yet, in stede of God almyght, / They honour the sone for his great light, / For that doth them great pleasure" (ll.779-81, 788-90).

The same passage reveals Rastell's patriotic attitude. The playwright proclaims voyages to distant lands to be "an honorable thynge" because they contribute to the extension of the English dominion in the world and thus bring profit to the king and the country ("And also what an honorable thynge, / Bothe to the realme and to the kynge, / To have had his domynyon extendynge / There into so farre a grounde…"(ll.772-75)). For Rastell, King Henry VII seems to be that ideal monarch who was aware of the importance for the state and the great significance of overseas voyage. The playwright argues that those statesmen who deny the advantages of exploring new lands will have to give up their privileges to the French or other nations that have already succeeded in establishing profitable trade links with the American continent (ll.812-14).

In this way, according to J. Rastell, an educated man, one equipped with all kinds of knowledge, can serve his country in a better way than an unlearned person. In this context it is worth mentioning that at the very beginning of *Four Elements* the English humanist defines clearly enough the objective of learning: it must bring benefit to the commonwealth. He praises the learning aimed at exploring the world and the physical reality that surrounds us, educating compatriots and inhabitants of other lands so that they could have an idea of their rights and duties, reforming society to the advantage of every one of its members. J. Rastell deprecates learning for personal enrichment, saying that in this case a rich man's conscience would be evil. Only a man who, on becoming educated, works for his neighbour's good deserves respect from the community and God's grace bestowed to him: "A great wytted man may sone be enrychyd, / That laboryth and studyeth for ryches only, /

But how shall his conscyens than be discharged? / For all clerks afferme that that man presysely, / Whiche studyeth for his owne welth pryncypally, / Of God shall deserve but lytyll rewarde" (ll.78-83).

It is not only the play's ideology that makes it different from the traditional morality sample. The way the author of *Four Elements* interprets the drama's characters is also quite unusual in the early Tudor dramatic context. While clerical drama of the Middle Ages mainly relied upon virtues and vices as the opposite forces that struggled for man's soul, in J. Rastell's play one of the antagonistic sides is represented by allegorical figures of man's mental qualities which can be acquired by him in the process of learning and work. Such a character as Studious Desire is to be given special attention in this regard. This instructor of Humanity stimulates his student's interest in studies by suggesting disputable topics for discussion (like the shape of the Earth (l.381)) or by inviting Experience to share his ideas and observations with Humanity, for instance in order to exemplify the thesis regarding the infinite variety of habits and modes of life on the planet (ll.672-80). Experience, in his turn, mentions the necessity of a systematic and professional approach to the exploration of the world. To be a successful researcher one is to use special devices and instruments (a map, a globe, a telescope, etc) in his work. Incidentally, as R. Axton assumes, the main stage property of Rastell's play might have been a huge terrestrial globe (6).

Though Sensual Appetite seems to be a rather typical character of morality drama (see, for example, H. Medwall's play *Nature* in which the allegorical figure of Sensuality leads the company of Vices), in *Four Elements* it is antagonistic to an acquirable intellectual capacity, that of Studious Desire. At the same time it keeps company with Ignorance, which is opposed to Experience. So, in his interlude, Rastell opposes Sensuality not to Reason as such (just as H. Medwall does in the play mentioned above), but to a definite mode of rational activity, i.e. to learning. In this way, one observes the particularization of the contents attributed to the main

positive character in Medwall's drama. J. Rastell emphasizes the importance of learning since for him it is only reasonable that a man should study. It is every rational man's need, according to the playwright, to understand simple natural things, those physical phenomena that he sees in his everyday life. Only then can a person get educated in lofty matters: he gets to know God and other "hye creaturis celestyall", "thyngys invysyble and vvysyble" (ll.114-16). This imperative of John Rastell's can obviously be perceived as an appeal to his contemporaries that they promote the development of secular sciences – the ones that are not focused on interpreting the Holy Scripture, the study of which was really at the foreground of education in medieval Europe.

The playwright's recognition of the significant role of translation as well as his emphasis on the importance of using the vernacular in the process of learning also seem to be quite in tune with the humanistic ideas of the new epoch. It is the Messenger who, in the introductory part of the interlude *Four Elements*, proclaims the English language at the present stage of its development to be appropriate and sufficient enough "to expound any hard sentence evydent" in it (l.26). So, he induces scientists to use the native language in their research. Besides, there are inquiring wits and noble men "of meane estate" (l.30) who can read no other language but English, and for whom the best works of foreign authors (Greeks and Romans first of all) are to be translated into their mother tongue: "Than yf connynge laten bokys wee translate / Into englyshe, wel correct and approbate, / All subtell sciens in englyshe might be lernyd / As well as other people in their owne tonges dyd" (ll.32-5).

The negative characters of Rastell's play deserve closer attention. It is noteworthy how Humanity makes the acquaintance of Sensual Appetite right after the lecture in Geography. Sensual Appetite enters the action so rapidly that he knocks down Studious Desire, who is about to leave. In this way, the allegoric figure's appearance is in itself a manifestation of its antagonism to the values

propagated by Nature and her company. Sensual Appetite verbalizes immediately his attitude towards serious matters like praying or studying: "For I se well it is but a foly / For to have a sad mynd" (ll.420-21). He declares his hatred to Studious Desire who has "a shrewde smell", as he puts it (l.439). At the same time he seems to be dead sure of the extreme need for him in every person's life.

When Sensual Appetite invites Humanity to have a rest at a good tavern and Humanity accepts the offer, feeling much weary after his classes, the Taverner enters the scene with the words "Beware, syrs, now let me have room" (l.556). This mode of the character's appearance means that Rastell's interlude was probably written to be performed in a banquet hall during some festivity. In these cases, interludes were played in the middle of the hall, with the viewers surrounding the space of the dramatic action and actors sometimes having to cry out such warning cues to make the audience step aside and give them way.[4]

The figure of the Taverner as a representative of the commons appears to be quite relevant as part of the interlude's entertainment. It is well known that characters of this kind played major roles in the popular literature of the Middle Ages and of the Renaissance. The Taverner from J. Rastell's interlude *Four Elements*, similarly to characters from numerous jests and farces, mocks women, thus resonating with the topic of misogyny that was very popular in medieval and Renaissance town literature. For instance, when answering Sensual Appetite's pseudoscientific observation on poultry being light for digestion because it flies, the Taverner says that he knows lighter meat than that. It is a woman's tongue since nothing it says has any weight or sense (ll.600-01).[5] It is noteworthy that the Taverner's attitude to his clients depends upon the sum of money they are going to spend at his tavern. In this way, the playwright satirizes taverners' ill-breeding and rudeness with ordinary people and their plebeian kowtowing with the rich at the same time.

The third negative character, Ignorance, is very much like Sensual Appetite in his contempt for science and exaggeration of his power (greater than that of the kings of England or France (ll.1148-49)). Just like Sensual Appetite, this allegorical character believes that learning is sad and boring while man's life should be merry and joyful (ll.1223-28). And he does his best to provide the dramatic plot with merry insertions. Is this perforating juxtaposition of serious and entertaining episodes in *Four Elements* symmetrical, or does one of the two modes prevail in the play? While looking for the reply to this question we may come closer to stating the ideology and generic strategy of J. Rastell's play.

As L. B. Wright observes regarding the genre of *Four Elements*, it is one of "the most curious" specimens of the interlude representing a dramatized lesson in science, while in many interludes of that epoch the entertaining impetus dominates over the didactic component (6). So, the scholar emphasizes the power of lecturing in Rastell's play. *Four Elements* is usually referred to as "scientific instruction" by Tudor drama researchers and the play is often used to illustrate the thematic diversity of the Tudor interlude. But there are scholars who consider this approach to Tudor plays, based upon a thematic criterion, to be rather sophomoric (see Craik 37).

It is noteworthy that the playwright's introduction to the play includes permission to disregard "the sad matter" in *Four Elements* and thus to shorten the performance to almost half its length, from an hour and a half to three quarters of an hour in length. "The sad matter" to be removed, according to J. Rastell, may possibly consist of the Messenger's part and some of Nature's and of Experience's parts. A reader may be quite confused by this suggestion of Rastell's, since in this case the play would be deprived of its contents, the conveyance of which was definitely the humanist's priority.

As to the "merry matter" of the play, it is stipulated to be considerable enough by the playwright's choice of the generic form of the interlude. In Rastell's

days it was a general trend to compose interludes with their informal style of presentation, easy way of communicating with the audience, inclination to improvisation, emphasized entertainment value, etc. The author's mouthpiece, the Messenger, says at the very beginning of the play: "Wherfore to my purpose, thus I conclude / Why shold not than the auctour of this interlude / Utter his owne fantesy and conseyte also, / As well as dyvers other nowadays do?" (ll.46-9). Thus the generic form of the interlude, inheriting as it did the medieval morality principle of alternating didactic and entertaining episodes, allowed the playwright to demonstrate his wit, sense of humour, and linguistic ingenuity. And, although J. Rastell warns his reader that he should not expect too much eloquence or rhetorical skill from an inexperienced author, all this sounds like a display of modesty on his part, in what amounts to a rather popular topos in Tudor literature.

At the same time Rastell explains that the subject of his "phylosophycall work" does not combine well enough with the entertaining elements of the play. But, since some people are not prone to perceiving serious things rendered in the proper way, in his drama he blends serious and merry elements to bring his idea to them in a better manner. R. Axton considers the technique of alternating didactic and entertaining episodes used by Rastell to be unfair enough towards the drama's spectators. From the scholar's point of view, the inequity lies in the fact that studies are associated with "sadness" in *Four Elements* and, consequently, that they are opposed to "myrth and sport", which belong to the sphere of vice or sin (Axton 14). The playwright's strategy is aimed at making the play's central character (and its audience as well) feel guilty of devoting his time to leisure, and not to study. R. Axton correlates this ethical approach of Rastell's with the spirit of the epoch, when the Reformation movement was still being formed.[6] As the scholar observes, the moral principles that laid the foundation of Reformation ethics eventually affected the English national character (Axton 15).

Thus, the problems and the characters of Rastell's interlude attest to the drama's humanistic tendency which is at the same time marked by the intellectual and spiritual challenges of the early New Age. The author of the interlude *Four Elements* is convinced of the great role of science and secular education in the process of personality formation, and this conviction is rooted in his apologetics of the humanistic movement. Humanists like John Rastell believed that man could improve his natural qualities and talents as well as the social order as it was by means of studies. The play also reflects the ethical principles of the forthcoming Reformation, especially in regard to leisure and mirth as opposed to learning.

As a conclusion, one might say that the theme of John Rastell's interlude *Four Elements* is consonant enough with the ideas to which the outstanding English humanist, lawyer, statesman, and editor adhered during his prolific professional career. In his play John Rastell emphasizes the great importance of science and learning as true priorities of a modern society.

[1] Rastell's faith in the great power of the printed word turned out to be decisive for the preservation of the early Tudor playwrights' works. Out of the eighteen plays that were published in England up to 1534, at least twelve appeared in printed form at John and then William Rastell's publishing house (Wilson 23).

[2] The first research of John Rastell's life and works was included in A. W. Reed's *Early Tudor Drama* (1926). In further decades this subject matter was tackled by such scholars as F. S. Boas, R. Axton and others.

[3] All quotations from the text of Rastell's interlude are from: Rastell, John. *Four Elements*. *A New Interlude and a Merry, of the Nature of the Four Elements*. Electronic source:

http://www.ota.ox.ac.uk/scripts/download.php?approval=94119e44f20f1594ebd8, with an indication of line numbers.

[4] Also see remarks pronounced by Humanity and Ignorance in the final part of the text, right before Sensual Appetite starts dancing (l.1332, 1335).

[5] Usually in early Tudor morality plays and interludes the speech of characters referring to evil forces is full of wordplay and verbal humour. This is also true of Rastell's play (see, for example, Sensual

Appetite's remarks, such as: "the devyll pull of his skyn" (l.447), "I pray God the devyl take you!" (l.534), "Goggys naylys, I have payed som of them, I tro" (l.1157), etc., or those of the Taverner's: "Ye, that I can well purvey, / As good as ever you put to your nose, / For there is a feyre wenche callyd Rose / Dystylleth a quarte every day" (ll.952-55)).

[6] At the end of his lifetime John Rastell was one of Thomas Cromwell's companions, advocating the programme of a civil law reformation as well as the reformation of the Supreme Court and the Church in England.

Works cited

Axton, Richard. Introduction. *Three Rastell plays*. *Four Elements*, *Calisto and Melebea*, *Gentleness and Nobility*. Ed. Richard Axton. Cambridge: D.S.Brewer Ltd, 1979. 1-26.

Boas, Frederick S. *An Introduction to Tudor Drama*. Westport: Greenwood Press Publishers, 1977.

Craik, T. W. "The Tudor Interlude and Later Elizabethan Drama." *Stratford-upon-Avon studies 9. Elizabethan theatre* (1966): 37-57.

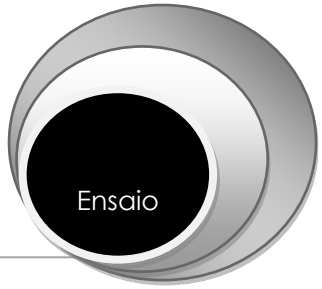
Rastell, John. *Four Elements*. *A New Interlude and a Merry, of the Nature of the Four Elements*. Electronic source:
http://www.ota.ox.ac.uk/scripts/download.php?approval=94119e44f20f1594ebd8

Reed, A. W. *Early Tudor Drama. Medwall, the Rastells, Heywood, and the More circle*. London: Methuen and Co. Ltd., 1926.

Wilson, F. P. "The earlier Tudor Morality and Interlude." *The Oxford History of English Literature*. Ed G. K. Hunter. Oxford: Clarendon Press, 1969. 1-46.

Wright, Louis B. *Shakespeare's Theatre and the Dramatic Tradition*. Washington: The Folger Shakespeare Library, 1958.

Jane Marcet and the Popularisation of Science in Britain



Gabriela Gândara Terenas | Universidade Nova de Lisboa

(Lisboa, Portugal)

> without entering into minute details of practical chemistry, a woman may obtain such knowledge of the science as will not only throw an interest on the common occurrences of life, but will enlarge the sphere of her ideas, and render the contemplation of nature a source of delightful instruction (Marcet I: 3)

Introduction

The importance of the discursive strategies used in popularising science, more particularly in the nineteenth-century press,[1] has been becoming increasingly apparent in my works dealing with science and culture in Great Britain, especially those concerned with the fictionalisation of science in the nineteenth and twentieth centuries. This paper deals with the way such aspects feature in a book written by Jane Haldimand Marcet (1769-1858), a figure largely forgotten nowadays, but who was widely referred to in the Portuguese press of the mid-nineteenth century as a great populariser of science.

For this reason, the paper will deal briefly, at the outset, with the reception of Jane Marcet's work in the periodical press in Portugal, which associated her not only with the celebrated scientific developments which were taking place in Britain, but also with the role of women in Victorian society. Secondly the paper will focus, in greater depth, upon the discursive strategies used to propagate scientific knowledge by Mrs. Marcet in her book entitled *Conversation on Chemistry* (1805), which was a real best-seller at the time.

Citação: Gabriela Gândara Terenas, "Jane Marcet and the Popularisation of Science in Britain". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 58-74. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

The paper will discuss to what extent the recourse to such strategies, ostensibly used with the aim of propagating scientific knowledge, achieved its goals. Although it is a fact that the book was an enormous sales success, being accessible to the public and even popular, it does not follow that the author was guilty of oversimplification of language or content. For the dividing line between the "scientific" dissemination of Science and the so-called vulgarisation or popularisation of the same is sometimes fainter and more fluid than might at first be supposed.

1. English Women and the Advancement of Science in Britain: Echoes in Portuguese Periodicals

The evocation of Jane Marcet in the Portuguese periodical press of the second half of the nineteenth century is to be found in a series of articles which praise the British educational system and the education of women, in particular.

In an era marked by an awareness of the precarious situation of the Portuguese education system and by a profound belief in reforms which would extend state education, the journalists in question held the view that the well-organised British system, traditional yet in touch with the times and provenly successful, was a true model to be emulated. Indeed, according to many cultural and literary magazines, Britain owed its superiority in the world to its education system, as education was seen as an indispensible way of achieving material progress for a nation and intellectual and moral development for its people. Conscious of the backwardness of Portugal compared with what they considered to be the more civilised European nations, these journalists appealed for the country to take advantage of its irrevocable position by learning from the experiments carried out in Britain, and taking a vigorous leap forward to raise the state education system to a place amongst the best in the world.[2]

The comparison between the Portuguese education system and the British model was inevitable. Whilst reforms in Portugal had been revealed as inept, due to the fact that the real problems had never been properly analysed and solved, in Britain, on the other hand, such questions were assessed by specialists and any alterations introduced were not according to the whims of a ill-informed Minister, but in response to the real needs of the country, preserving, rather than destroying for personal reasons, what had worked well and improving in full awareness what had proved to be wanting.[3]

From the exemplary British system, the Portuguese press tended to emphasise female education, which was frequently associated to the intellectual emancipation of Portuguese women.[4] Mediated by the teaching of Hippolyte Taine (1828-1893) in his *Notes sur l'Angleterre* (1872),[5] the Portuguese journalists considered that the education of women in Britain, as it took place both in educational institutions and in the home, was an example to be followed. In an article translated from French and published in the magazine *A Mulher* (Lisbon, 1883-1885), particular attention is devoted not just to learning in the different fields of science but specifically to the practice of fossil collecting:

> In the case of both modest and wealthy families, all [the young ladies] learn . . . a lot of natural history, botany, mineralogy, geology; they have a particular inclination for the things of nature; and in the countryside, at the seaside, in their frequent travels, they are able to see minerals, plants, shells and can make collections . . . . so they are better taught, more solidly educated, than our girls are (Taine, "A Mulher Inglesa" 45).

Particularly significant to the topic of this paper are the concrete examples of British women who had distinguished themselves in the Sciences, who were given as models to be emulated by Portuguese women. Amongst them was the famous Mary Somerville (1780-1872),[6] of whom much has been written, but also the less well-known Jane Marcet, the science populariser who is the subject of the present

paper. It is worth recalling what the editor of *A Voz Feminina*, which was published in Lisbon, between 1868 and 1869, wrote about this remarkable woman in one of the articles in her magazine:

> "Conversations on Chemistry", by Mrs. Marcet, is still the work from which one can gather the clearest and most concise notions on that fascinating Science. Without tiring one's understanding, the author makes us familiar with a thousand and one phenomena, and with the thousand and one transformations which go on around us in everyday life (Wood, "As Senhoras Inglesas" 2).

The journalist was referring to the book *Conversations on Chemistry. Intended more Especially for the Female Sex*, published for the first time anonymously in 1805 and which by 1850 would have had 16 editions in England and 23 in the United States,[7] becoming a true best-seller for the first half of the nineteenth century, particularly in the English-speaking world, as there were only three French translations,[8] and no Portuguese translation, as far as can be determined.

Having explained the context of this encounter with Jane Marcet -- the Portuguese press of the second half of the nineteenth century and the relationship of English women with Science, particularly with regard to the education they were given and the role they played in the propagation of such knowledge -- I will now move to the central issue of this paper: the analysis of the discursive strategies employed by Mrs. Marcet in her book *Conversations on Chemistry*. In the preface to the 1805 edition, the author herself sets down her aim of popularising this branch of scientific knowledge, particularly amongst female readers, whilst, at the same time, justifying the title and the discursive strategies she employs:

> In venturing to offer to the public, and more particularly to the female sex, an Introduction to Chemistry, the author, herself a woman, conceives that some explanation may be required; . . . frequent opportunities having afterwards [after attending experimental

> lectures][9] occurred of conversing with a friend on the subject of chemistry . . . . Hence it was natural to infer, that familiar conversation was, in studies of this kind, a most useful auxiliary source of information; and more especially to the female sex, whose education is seldom calculated to prepare their minds for abstract ideas, or scientific language (Marcet I: v).

2. The 'Popularisation' of Science in *Conversations on Chemistry*: Discursive Strategies

Having chosen to employ an eminently didactic style in the two volumes which make up *Conversations on Chemistry*, Jane Marcet makes use of several strategies which are characteristic of fictional writing (particularly the narrative, but also, in certain cases, the dramatic register) to achieve her aim of disseminating knowledge on chemistry. Hence, at certain times, the author creates the illusion in her targeted readership (female) that they are reading a work of fiction, a novel, perhaps, and not really a scientific treatise.

Right from the start she introduces three female characters and an ambience which might well be familiar to her potential readers: a sweet and knowledgeable governess, Mrs. B or Bryan,[10] and two exemplary pupils, Emily and Caroline.[11]

These three outlined or two-dimensional characters begin to become meaningful and establish differences and affinities between themselves through the words they say. Both the governess and her pupils can be defined by a single trait, a fundamental characteristic which accompanies each of them throughout the whole text. In the case of Mrs. Bryan, the characteristic can be defined as a blend of great wisdom, unflagging sweetness towards her charges and a profound commitment to her task, as she encourages them along the learning process by positive reinforcement. The expressions she uses are demonstrative of such attributes, for example: "my dear Caroline", "very true Caroline, that is an excellent objection", "very well indeed Emily", "you have both explained it extremely well", "you are perfectly right", "very well observed, Caroline", "You are mistaken, my dear" or

"you see, my dear, how easily you have became acquainted with these modifications".

Emily and Caroline are absolutely identical as characters, their most salient features being intelligence, an infinite curiosity and desire for knowledge, and enthusiasm as far as new discoveries are concerned. These characteristics are apparent in reoccurring expressions, such as: "but, pray, tell us more", "that is very extraordinary indeed!", "I am very curious to know", "it is wonderfully curious!" or "what a blaze!", but also in the way they formulate questions, make inferences or reach certain conclusions. The following are paradigmatic examples:

> Mrs. B.
>
> (...) It [the acid] has at present the appearance of a blue liquid; but when the union is completed, and the water with which the acid is diluted is evaporated, the compound will assume the form of regular crystals, of a fine blue colour, and perfectly transparent. Of these I can show you a specimen, as I have prepared some for that purpose.
>
> Caroline
>
> How beautiful they are, in colour, form, and transparency!
>
> Emily
>
> Nothing can be more striking than this example of chemical attraction. (Marcet I: 18-19)

or

> Emily
>
> If it is known, then, with which of the electricities [sic] bodies are united, it can be inferred which will, and which will not, combine together?
>
> Mrs. B.
>
> Certainly. I should not omit to mention, that some doubts have been entertained whether electricity be really a material agent, or whether it might not be a power inherent in bodies, similar to, or, perhaps identical with, attraction.
>
> Emily

> But what then would be the electric spark which is visible, and must therefore be really material?
>
> Mrs. B.
>
> What we call the electric spark, may, Sir H. Davy says, be merely the heat and light, or fire produced by the chemical combinations with which these phenomena are always connected. (Marcet I: 25)[12]

Simply sketched out as they are, the three characters are totally predictable from the beginning of the second chapter. Indeed, in obedience to their bi-dimensional nature, none of them alters their behaviour in any way during the lengthy narrative, and consequently the reader is never surprised by any enigmatic gesture or contradictory reaction. Mrs. B or Bryan, Caroline and Emily, each correspond to idealised stereotypes of a governess and her two charges, belonging to the upper-middle class of the beginning of the nineteenth century.

For a writer of science books rather than novels, using two-dimensional characters is not only an easier choice, as it is not necessary to bother with their posterior development, but it also serves the purpose perfectly. In effect, Mrs. Marcet was not interested in attracting the reader's attention with a complex plot, but rather in teaching the basic fundamentals of a branch of science in an undemanding and pleasant way. These outlined characters, therefore, serve her purpose by keeping the reader focussed on the content of the dialogues. Indeed, the voices of the three characters are heard only in direct discourse, through the previously mentioned dialogues. It is through them that the characters carry out the teaching and learning process, express their uncertainty, clarify ideas or exchange points of view regarding certain issues or experiments, whilst simultaneously giving voice to potential doubts, the perplexity or emotion which is shared by the (female) reader or even by specialists. As far as the ordinary reader is concerned, this kind of subterfuge is related to the heuristic methods so often employed in the

transmission of knowledge, at least since the days of Ancient Greece. The following is a case in point:

> Caroline
>
> But in what matter does life enable these organs [organized bodies] to perform their several functions?
>
> Mrs. B.
>
> That is a mystery which, I fear, is enveloped in too profound darkness for us to hope that we shall ever be able to unfold it. We must content ourselves with examining the effects of this principle; as for the cause, we have been able only to give it a name, without attaching any other meaning to it than the vague and unsatisfactory idea of an unknown agent.
>
> Caroline
>
> And yet I think I can form a very clear idea of life.
>
> Mrs. B.
>
> Pray let me hear how you would define it?
>
> Caroline
>
> It is perhaps more easy to conceive than to express – let me consider – Is not life the power which enables both the animal and the vegetable creation to perform the various functions which nature has assigned to them?
>
> Mrs. B.
>
> I have nothing to object to your definition; but you will allow me to observe, that you have only mentioned the effects which the unknown cause produces, without giving us any notion of the cause itself.
>
> Emily
>
> Yes, Caroline, you have told us what life does, but you have not told us what it is.
>
> Mrs. B.
>
> We may study its operations, but we should puzzle ourselves to no purpose by attempting to form an idea of its real nature. (Marcet II: 98-99)[13]

On this point, it should be recalled that the dialogic subterfuge is not exactly an innovation in this context. For instance, amongst many works from different

periods, there are the *Dialogues* of Plato, *Dialogo dei massimi sistemi* by Galileo or *Entretiens sur la pluralité des mondes* by Bernard le Bovier de Fontanelle. The use of female characters, alone, in *Conversations on Chemistry* leads one to presume that, in elite circles at the end of the eighteenth and the beginning of the nineteenth centuries, the appreciation of female ability had already attained a relatively high level, probably due to the influence of the Enlightenment and the French revolution, which were both relatively recent.[14]

It is generally accepted that dialogues or the dialogic structure are also an essential aspect of any fictional text. Though always conveying information on a certain activity, generally a scientific experiment performed by the characters, the text under study hinges essentially on the dialogue, i.e. the "conversations" which continually take place between the characters. The discourse is thus made up exclusively of dialogues, segments which Anglo-American critics call "scenes".

In drama this structure is predominant, so it could be argued that Jane Marcet often adopted discursive strategies which are shared by stage writing. From the outset, the author of the text is concealed or disguised, both to the characters and the readers of the book. The immediate and explicit responsibility for the acts of enunciation is assumed by the characters, who communicate with each other and with the readers, without intratextual mediation. Hence it is that any aspects which are presented in descriptive form, such as the experiments, only occur within a dialogic structure, in verbal interaction dominated by performative discourse, i.e. the discourse in which the characters – the enunciative instances –, "do things with words". For example:

> Mrs. B.
>
> . . . Ether is of this description [of fluids]; it will boil and be converted into vapour, at the common temperature of the air, if the pressure of the atmosphere being taken off.
>
> Emily

I thought that ether would evaporate without either the pressure of the atmosphere being taken away, or heat applied and that it was for that reason so necessary to keep it carefully corked up?

Mrs. B.

It is true it will evaporate, but without ebullition; what I am now speaking of is the vaporization of ether, or its conversion into vapour by boiling. I am going to show you how suddenly the ether in this phial will be converted into vapour, by means of the air-pump. Observe with what rapidity the bubbles ascend, as I take off the pressure of the atmosphere.

Caroline

It positively boils: how singular to see a liquid boil without heat!

Mrs. B.

Now I shall place the phial of ether in this glass, which it nearly fits, so as to leave only a small space, which I fill with water; and in this state I put it again under the receiver. (Plate IV. Fig.1) You will observe, as I exhaust the air from it, that whilst the ether boils, the water freezes.

Caroline

It is indeed wonderful to see water freeze in contact with a boiling fluid! (Marcet I: 111-113)[15]

In *Conversations on Chemistry*, like in a dramatic text, there is an "I" (Mrs. Bryan) who always speaks in direct discourse, to two "yous" (Emily and Caroline), whilst all three perform in a space which they perceive and organise in relation to themselves, using the present tense, to which the past and future are subordinated:

Caroline

Yes; I know that all bodies are composed of fire, air, earth, and water; I learnt that many years ago.

Mrs. B.

But you must now endeavour to forget it. I have already informed you what a great change chemistry has undergone since it has become a regular science. Within these thirty years especially, it has experienced an entire revolution, and it is now proved, that neither

> fire, air, earth, nor water, can be called elementary bodies. For an elementary body is one that has never been decomposed, that I to say, separated into other substances; and fire, air, earth, and water, are all of them susceptible of decomposition.
>
> Emily
>
> I thought that decomposing a body was dividing it into its minutest parts. And if so, I do not understand why an elementary substance is not capable of being decomposed, as well as any other. (Marcet I: 7-8)

Whereas there are no stage directions or scene breakdowns, the structure of *Conversations* is entirely made up of responses or linguistic acts performed by the characters, which make up the essence of the text, like in a drama which is intended to be read. Though not described, the scenery can be constructed by the reader's imagination.

In effect the atmosphere or environment in which the dialogues and scientific experiments occur, though not described, can easily be inferred by the reader from the conversations between the three characters. Sharing a friendly relationship, they are part and parcel of a space which has no external interference, and in which they have at their disposal instruments and materials to carry out the different experiments. It is not difficult, then, to imagine a spacious, well-lit drawing room, in a mansion, where two sisters are given private tuition by a kind governess who is extremely well prepared, from the intellectual viewpoint, for the times. Such a *milieu* would not have been unfamiliar to the author. In *Jane Marcet. An Uncommon Woman* (1993), her biographer Bette Polkinghorn describes the impeccable education provided by Anthony Francis Haldemand for his children, at home. Haldeman ensured that his daughters were not discriminated in any way, especially Jane, who showed signs of being intelligent, curious and gifted from an early age.[16]

The biography suggests that, up to a point, Jane may have based the atmosphere in which the characters of *Conversations* interact and converse on her

own experiences as an adolescent. It may, therefore, be affirmed that there is a degree of autobiographical projection in the book, which for this reason, too, is closer to a fictionalised narrative than a compendium on Chemistry.

Final Considerations: Popularisation or Scientific Dissemination of Science?

By using the discursive strategies which belong to fictional writing, rather than those which would be expected in a compendium or treatise on Chemistry, Jane Marcet created an illusion in the mind of the reader regarding the simplicity of scientific knowledge, which made it more accessible to readers who were unfamiliar with the subject, particularly women. It can be seen, however, that the recourse to these processes and artifices, far from oversimplifying or banalising the subject, was successful both in passing on knowledge about Chemistry, and making it interesting and accessible to the uninitiated reader. Whereas the discursive strategies she employed captured her readers' attention, her success was also due to the surprisingly up-to-date content of the subjects that Mrs. B tirelessly presented for discussion.

In effect the contents of the dialogues are a true treatise upon what was known at the time on Chemistry and other branches of Science which were in any way linked to this area. Indeed, Jane Marcet regularly attended lectures and experiments carried out at the Royal Institution,[17] particularly those of the eminent scientist, Sir Humphry Davy (1778-1829), who is abundantly referred to in Marcet's work. She also had the opportunity to discuss the lectures and to repeat the experiments at home, with her husband, the doctor Alexander John Gaspar Marcet (1770-1882), who, after his wife had inherited an enormous fortune, devoted himself to scientific research.[18] For this reason many of the questions and comments seem improbable when they are placed in the mouths of two adolescent girls of the first decade of the nineteenth century, a fact which Marcet, herself, recognised.[19]

Seen from this angle, the communicative interaction between the characters, though effective as far as the targeted readership is concerned, is somewhat artificial, as it is produced in a peculiar enunciation context and with a specific purpose – to teach chemistry.

Although it is often seen as being less erudite and directed towards a public which was less culturally aware, (particularly if it is compared with the last few decades up to the present), the popularisation of Science at the turn of the nineteenth century was not, in fact, very different from what is denominated as the "scientific" dissemination of Science. Or, to put it a different way, using Stephen Hilgartener's terminology, the difference between "real and genuine science" and "popularised science" is more fluid than one might at first realise (520, 524).[20]

On this point it is curious to verify that in the first edition of the book, published anonymously in 1805, the subtitle was "intended more especially for the female sex" whilst in later editions it was substituted by "in which the elements of that science are familiarly explained and illustrated by experiments." The success of the book was certainly not due to women alone but also to readers with more specialised interests. It may be recalled in this context that the famous scientist Michael Faraday (1791-1867) would recognise the decisive influence *Conversations on Chemistry* had on himself.[21]

Broadly speaking, the fortunes of this and other books by the same author were excellent until the middle of the century, it having been used as a school text book in England and particularly in the United States. *Conversations on Chemistry* was, therefore, widely disseminated, making it comparable, albeit on a more modest scale, with the publication of later works by William Whewell (1794-1866), Mary Somerville (previously mentioned) or even the tremendous impact of *Principles of Geology* by the great geologist Charles Lyell (1797-1875).

Moreover, Marcet would also influence the economic and political thinking of Harriet Martineau (1802-1876), particularly with her book *Conversations on Political Economy* (1816), but this, of course, would be a topic for a different paper.

[1] Cf. Terenas, "Modelos Britânicos".

[2] Cf. R.[?], "Administração Pública Interna" and Chagas, "Algumas Reflexões", 56.

[3] Cf. Chagas, "Algumas Reflexões" 18-19, "Algumas Reflexões" 56.

[4] On this question, note the references to the thinking of John Stuart Mill (1860-1873) as he expressed it in *The Subjection of Women* (1869), particularly in the periodical *O Progresso* (1869) whose editor was Francisca de Assis Martins Wood, a woman who had been educated in England and was married to an Englishman. Cf. Wood, "O Que se Faz Lá fora" 213.

[5] On French mediation in the representation of images of Great Britain in the Portuguese press cf. Terenas, "French Mediation", and "A Grã-Bretanha".

[6] Mary Somerville (1780-1872) published several works of a scientific nature, was a member of London intellectual circles and was friendly with Herschell, Lyell and De Condolle, amongst other scientists of her day. Amongst her more important works are: *The Magnetic Properties of the Violet Rays of the Solar Spectrum* (1826), *The Connection of the Physical Sciences* (1834), *Physical Geography* (1848) and *Molecular and Microscopic Science* (1869).

[7] It should be noted that in several editions, the author took care to update the information in accordance with the latest discoveries, as she herself affirmed, for example, in the *Advertisement* to the 1817 edition: "The author, in this fifth edition, has endeavoured to give an account of the principal discoveries which have been made within the last four years in Chemical Science, and of the various important applications, such as the gas-lights, and the miner's lamp, to which they have given rise" (Marcet I: iii).

[8] Cf. Bahar 29.

[9] It should be recalled that, in the final decades of the eighteenth century, the presence of women in talks and lectures on science was very common. On this question Cf. Polkinghorn 17.

[10] Although in the editions which I was able to consult (1806, 1817 and 2010) this character is only identified as Mrs. B., certain authors have recognized in her the figure of Anna Barbauld (Shteir) or Margaret Bryan (Lindee 10). In the recent Cambridge University Press publication (2010), the editor refers to her clearly in a note as Mrs. Bryan.

[11] It should be noted that certain authors consider Emily to be more "earnest" and Caroline more "flighty". However, in my opinion, at least in the work under analysis, this is not the case, this distinction being based, perhaps, on other works by Marcet in which the two characters are better defined.

[12] See also Marcet I: 6, 27, 29, 72-73, and Marcet II: 135-136.

[13] See also Marcet I: 161-162, 240, and Marcet II: 194-195.

[14] According to Ann B. Shteir, in the final decades of the eighteenth century and the first of the nineteenth, several women devoted themselves to the popularisation of Science, particularly Botany. Amongst them were Priscilla Wakefield, Maria Jacson and Elizabeth Fitton. During the nineteenth century and particularly in the first decade of the twentieth, the number of publications of a scientific nature written by women increased substantially, as can be seen from the table supplied by Mary Creese (276).

[15] See also Marcet I: 17-18, 93-95.

[16] Cf. Polkinghorn: 4, 131.

[17] The principal function of the Royal Institution (founded in 1799) was to provide public enlightenment through popular lectures. Science was then in fashion and chemistry was all the rage. The demonstrations lectures on science at this time were genuinely theatrical spectacles and attracted large and fashionable audiences. Under Sir Humphry Davy, the Royal Institution became simply the most elegant and fashionable centre for such rational entertainment. Cf. Rosenfeld 789, and Bahar 43-44.

[18] Cf. Marcet I: vi, and Rosenfeld 787.

[19] Cf. Marcet I: viii-ix.

[20] In his paper "The Dominant View of Popularization: Conceptual Problems, Political Uses", Stephen Hilgartner criticises the culturally-dominant view of popularisation of science based on an "idealized notion of pure, genuine scientific knowledge against which popularized knowledge is contrasted." Therefore, he argues that this dominant view oversimplifies the process, as the scientists themselves, "when it suits their purposes", issue "simplified representations for broader audiences . . . with the authority of the cultural symbol 'Science'". In fact, "when one looks carefully for the precise location of the boundary between genuine scientific knowledge and popularized representations, one runs into trouble, stemming from the fact that scientific knowledge is presented in many contexts" (520, 524).

[21] Cf. Marcet I: n. pag., and Polkinghorn 29.

Works Cited

Bahar, Saba. "Jane Marcet and the Limits to Public Science." *The British Journal for the History of Science* 34 (2001): 29-49.

Chagas, M. [Manuel Joaquim] Pinheiro. "Algumas Reflexões Sobre a Instrução Pública." *Arquivo Pitoresco* 3 (1865): 18-20.

---. "Algumas Reflexões Sobre a Instrução Pública." *Arquivo Pitoresco* 7 (1865): 55-56.

Creese, Mary R. S. "British Women of the Nineteenth and Early Twentieth Centuries Who Contributed to Research in the Chemical Sciences." *The British Journal for the History of Science* 24 (1991): 275-305.

Hilgartner, Stephen. "The Dominant View of Popularization: Conceptual Problems, Political Uses." *Social Studies of Science* 3 (1990): 519-539.

Lindee, M. Susan. "The American Career of Jane Marcet's *Conversations on Chemistry*, 1806-1853." *Isis* 82 (1991): 8-23.

Marcet, Jane. *Conversations on Chemistry, in which the Elements of that Science are Familiarly Explained and Illustrated by Experiments. Volume 1: On Simple Bodies*. Cambridge: Cambridge UP, 2010. From the 5th edition, "revised, corrected and considerably enlarged" (London: Longman, 1817).

---. *Conversations on Chemistry. In which the Elements of that Science are Familiarly Explained and Illustrated by Experiments. Vol. II. On Compound Bodies*. London: Longman, 1806.

Polkinghorn, Bette. *Jane Marcet. An Uncommon Woman*. Aldermaston: Forestwood Publications, 1993.

R. [?]. "Administração Pública Interna." *Anuário do Arquivo Pitoresco* 26 (1866): 203.

Rosenfeld, Louis. "The Chemical Work of Alexander and Jane Marcet." *Clinical Chemistry* 47 (2001): 784-792.

Shteir, Ann B. "Botanical Dialogues: Maria Jacson and Women's Popular Science Writing in England." *Eighteenth-Century Studies* 3 (1990): 301-317.

Taine, H. [Hippolyte]. "A Mulher Inglesa." *A Mulher* 6 (1883): 45.

---. *Notes sur l'Angleterre*. Paris: Librairie Hachette, 1899 (1st edition: 1872).

Terenas, Gabriela Gândara. "French Mediation, the Construction of British Images and the Portuguese Press." *Beyond Binarisms. Crossing and Contaminations: Studies in Comparative Literature*. Ed. Pina Coco and Eduardo F. Coutinho. Rio de Janeiro: Aeroplano Editora, 2009. 161-170.

---. "A Grã-Bretanha Enquanto Modelo Civilizacional. A Educação: Continuidade e Inovação." "Diagnoses Especulares: Imagens da Grã-Bretanha na Imprensa Periódica Portuguesa (1865-1890)." Diss. Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa, 2004. 471-510.

---. "Modelos Britânicos e Vulgarização Científica na Imprensa de Oitocentos." *Ciência e Cultura. Ficcionalizações da Ciência na Grã-Bretanha (Séculos XIX e XX)*. Ed. Filipe Furtado and Gabriela Gândara Terenas. Casal de Cambra: Editora Caleidoscópio, 2012. 195-211.

Wood, F. [Francisca de Assis Martins]. "O Que se Faz Lá fora." *O Progresso* 102 (1869): 212-213.

---. "As Senhoras Inglesas e o Direito Eleitoral." *A Voz Feminina* 59 (1869): 2.

Visual Darwinism Caged in the Exoticism of Natural Theology: Echoes of Victorian Ornithology in *Jane Eyre*[1]

Ensaio

Sara Vicente | Universidade Nova de Lisboa, CETAPS (Portugal)

Introduction

This paper aims to analyse the echoes of Thomas Bewick's (1753-1828) *History of British Birds* (1797-1826) in Charlotte Brontë's (1816-1855) *Jane Eyre* (1847) and it will focus on the way the illustrated compendium served both as a mental escape from reality for most of the readership of ornithological publications, like the heroine of Brontë's novel, and as a legacy with which visual Darwinism had to cope.

Firstly, I will pay special attention to Thomas Bewick's illustrations of isolated birds with insufficient suggestions of the environment, devoid of references to the adaptation of the species to their natural habitat, aimed at conveying a message of harmony and order as a sign of divine craftsmanship as was argued at the time by the supporters of Natural Theology. *History of British Birds* followed the path of Natural Theology also by highlighting the exoticism of birds in general, depicting them only in undisturbed environments where absolutely no harm could reach them. Despite Thomas Bewick's incipient depictions of the natural environment, the exoticism of birds functioned as the key aspect to reach a wider readership, regardless of their level of ornithological or zoological knowledge, leaving to Charles Darwin (1809-1882) the complex task of dealing with his predecessors' views and illustrations of the animal kingdom framed by Natural Theology. As is possible to observe in the opening pages of Charlotte Brontë's novel, Jane Eyre, like most nineteenth century readers of illustrated books, looked for the peacefulness of Bewick's environments rather than the sceneries inhabited by species whose

Citação: Sara Vicente, "Visual Darwinism Caged in the Exoticism of Natural Theology: Echoes of Victorian Ornithology in *Jane Eyre*". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 75-93. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

ornaments were given special visual emphasis by Charles Darwin. He did this because of the core relevance of these adaptive features to explain an Evolutionary perspective of natural selection in general, and sexual selection in particular.

Later, I will take into account the constrictions of the conventions of bird illustration prior to *The Descent of Man, and Selection in Relation to Sex* (1871), which lacked the violence associated with moments of direct confrontation and competition between males to capture the female's attention and ultimately her preference. Visual Darwinism had to face these constrictions of bird illustration conventions while trying to convey as clearly as possible an already extremely controversial natural process – natural and sexual selection – without shocking the readers who were used to the neutral harmonious views and ornithological illustrations of Thomas Bewick's and his predecessors' depictions of the natural environments. In this context, I will discuss the strategies used by Charles Darwin in the illustrations of *The Descent of Man* to articulate his new controversial Evolutionary perspectives of the relations between animals of the same or different species with the existing conventions of the visual presentation of the natural (peaceful) environments of eighteenth century ornithology.

Throughout this analysis I will try to provide answers to the following questions: did visual Darwinism break with these conventions by imposing the new Evolutionary theories visually or did it adapt itself to the constrictions inherent in the visual legacy left by Bewick and his followers?

Charlotte Brontë's ten-year old heroine, Jane Eyre, finds comfort in the observation of various exotic bird species in Thomas Bewick's compendium *History of British Birds* as a way to escape from her troublesome cousin John and her aunt, Mrs Sarah Reed, the second wife of Jane's uncle who had agreed to receive his niece after her parents' death. Against her will, Jane's aunt accepts the young orphan at the request of her husband who pities the poor girl and decides to provide a home for

his niece, treating her as one of his own children. Jane's constant mistreatment by her aunt and cousins, especially John, make her childhood miserable as they show her she is not welcome, mistreating her and highlighting the differences between her and the couple's own children.

Illustrated books such as Bewick's popular ornithological publication become Jane Eyre's gateway to different locations and environments, ones inhabited by exotic birds with attractive plumages, depicted as living in profound peacefulness, with the incipient scenery included in the illustrations as a contrast to her own life. During these brief moments of evasion, Jane Eyre travels to other places and spaces along with the birds she gazes at in profound wonder as she describes in the opening pages of this first-person narrative:

> I returned to my book – Bewick's History of British Birds […] there were certain introductory pages that, child as I was, I could not pass quite as blank. They were those which treat of the haunts of sea-fowl; of "the solitary rocks and promontories" by them only inhabited; of the coast of Norway, studded with isles from its southern extremity, the Lindeness, or Naze, to North Cape – […] Nor could I pass unnoticed the suggestion of the bleak shores of Lapland, Siberia, Spitzbergen, Nova Zembla, Iceland, Greenland, with "the vast sweep of the Artic Zone, and those forlorn regions of dreary space – that reservoir of frost and snow, where firm fields of ice, the accumulation of centuries of winters, glazed in Alpine heights above heights, surround the pole, and concentrate the multiplied rigours of extreme cold". (Brontë 10)

Travelling through the pages of this compendium allowed Jane to escape the harsh reality in which she lived and also the pain of losing both her parents. The descriptions of these distant locations fascinated the young orphan, enabling her to explore places without any sign of the hostility she was used to at her aunt's home. She longed, therefore, to keep discovering the world through Bewick's studies because "each picture told a story; mysterious often to my undeveloped

understanding and imperfect feelings, yet ever profoundly interesting […]. With Bewick on my knee, I was then happy: happy at least in my way, I feared nothing but interruption" (Brontë 10-1).

As the critic David Knight points out, "the primary purpose of any zoological illustration is to show what the animal is like" (Knight 12) and in Bewick's *History of British Birds* the illustrations focused specifically on the animal, centring it in the picture without specifying visually the natural surroundings it inhabited. Nonetheless, for younger readers like Jane Eyre, these scarce visual references to the environment were sufficient to give shape to the textual descriptions about each species presented in the compendium. If zoological illustration in general and ornithological illustration in particular is designed in the first place to display "what the animal is like", in the case of Bewick's illustrations the information that was visually conveyed proved to be insufficient to identify and understand the origins, the life and the habits of the animal depicted. Not only did the English illustrator not represent the bird interacting with members of the same or of other species, but neither did he show the conditions of the natural habitat which inevitably constrained the life of the animal and its own physical anatomy. In general, all the birds presented in Bewick's *History of British Birds* seemed to inhabit peaceful environments, with no imminent perils, focusing only on the animal itself (see Picture 1). This avoidance of the depiction of the natural environment leaves us with some questions concerning the ornithologist's intentions: did Bewick believe such insufficient standardised visual references to the surroundings were in fact enough to show what the animal was like to readers in general? Was this absence of a more detailed natural environment intentional? Did the illustrations run the risk of losing the exoticism and image of peacefulness that ornithological publications framed by Natural Theology wanted to convey if in these representations the animal were placed in its natural habitat and if this were depicted in detail?

Picture 1 - Thomas Bewick, *A History of British Birds. Vol. I. Containing the History and Description of Land Birds.* 1797, page 53.

The images of exotic birds with no visible signs of aggressive or ferocious behaviour even in the case of predators illustrated the conception that the universe and its inhabitants could coexist in harmony because that would be assured by the divine creator. Therefore, adaptive features such as claws and sharp beaks were avoided in these representations to eliminate any association with violence and hostility among the animals that could possibly reveal any incoherence with regard to the imagery of peacefulness conveyed by the supporters of Natural Theology like Bewick. These traits of the animal's body were strategically hidden or depicted with no relation to any aggressive attitude towards other animals because, ultimately,

they were incompatible with a life designed by the divine authority. In the preface to Volume II, Bewick refers to the authority of God in the creation and organisation of nature:

> Among the many approved branches of instruction, the study of Natural History holds a distinguished rank. To enlarge upon the advantages which are derivable from a knowledge of creation, is surely not necessary; to become initiated into this knowledge, is to become enamoured of its charms […]. In whatever way, indeed, the varied objects of this beautiful world are viewed; they are readily understood by the contemplative mind, for they are found alike to be the visible words of God. […] Could mankind be prevailed upon to read a few lessons from the great book of Nature, so amply spread out before them, they would clearly see the hand of Providence in every page; and would they consider the faculty of reason as the distinguished gift to the human race, and use it as the guide of their lives, they would find their reward in a cheerful resignation of mind, in peace and happiness […]. (Bewick, II, iv-v)

The natural habitats did not reveal any clue as to the utility of these adaptive features in relation to the conditions of the place where the animal lived. Apparently, and according to Bewick's visual illustrations in general, the conditions of the natural surroundings did not require any particular features from the animal that could help to assure its survival. Nonetheless, *History of British Birds* was published in two volumes: Volume I "Containing the History and Description of Land Birds" and Volume II "Containing the History and Description of Water Birds". This clear division established by Bewick between these two major environments – land and water – pointed though to the necessity to identify and classify the species found according to the place where they lived as the ornithologist claimed in the preface to the first volume:

> By dividing the various families of birds into two grand divisions, viz. Land and Water, a number of tribes have thereby been included among the latter, which can no otherwise be

> denominated Water Birds than as they occasionally seek their food in moist places, by small streamlets, or on the sea-shore; such as the Curlew, Woodcock, Snipe, Sandpiper, and many others. These, with such as do not commit themselves wholly to the waters, are thrown into a separate division, under the denomination of Waders. To these we have ventured to remove the Kingfisher, and the Water Ouzel; the former lives entirely on fish, is constantly found on the margins of still waters, and may with greater property be denominated a Water Bird than many which come under that description; the latter seems to have no connection with those birds among which is usually classed; it is generally found among rapid running streams, it which it chiefly delights, and from which it derives its support. (Bewick, I, v-vi)

In neither volume did the illustrations portray or grant any clues to provide a possible explanation as to how the conditions in which the animal lived intervened in its way of life, anatomy or physical changes related, for example, to the variations in the colour of their plumage according to climate changes and the natural conditions of the habitat. Nonetheless, as Bewick described in this extract from the preface to Volume I, he had carried out some research into the way of life of the different species he classified and included in his compendium. In fact, Bewick also pointed out the exact locations where these species could be found and provided information about what they lived on. Thus, the location and the natural environment were not irrelevant in the criteria he used for classifying the species but, in the end, there were no accurate or detailed visual representations of these habitats.

Notwithstanding Thomas Bewick's intention of revealing textually the environment each bird inhabited, visually, the illustrator did not include the animal in its natural surroundings.


98 BRITISH BIRDS.

THE FIELDFARE.

(*Turdus Pilaris*, Lin.—*La Litorne, ou Tourdelle*, Buff.)

Picture 2 - Thomas Bewick, *A History of British Birds. Vol. I. Containing the History and Description of Land Birds.* 1797, page 98.

In fact, Bewick's illustrations show the bird juxtaposed with the background scenery of its habitat in general (Picture 2) with no other species or members of the same species present, apart from the odd worm falling from the bird's beak in a few illustrations. Moreover, all the birds are depicted in the same position: a simple profile view. Insufficient details of the environment or the presence of other animals isolate the bird in the centre of the illustration, as Jonathan Smith claims, "without integrating the bird into that habitat" (Smith 99).

Despite Thomas Bewick's intention of providing textual information about the environments and the conditions of the species' location, his studies followed the visual tradition of eighteenth century ornithological illustrations that focused on the

species rather than providing detailed visual information about the environment and interaction with other animals. This taxonomic view of the animal kingdom (Fichman 22-3) reflected the centrality of Carl Linnaeus' (1707-1778) system of scientific classification of species (Lippincott and Blühm 16-7) and, therefore, in Bewick's predecessors' ornithological representations the emphasis was on the bird's structure and plumage rather than on portraying the conditions of its natural habitat or its interaction with other animals.

Later, the French naturalist Buffon (1707-1788), one of the naturalists most respected by Bewick,[2] stressed the importance of including the animal's surroundings even in such incipient ways as the eighteenth century illustrators did (Kemp 122). For example, Bewick's predecessors Eleazar Albin (1690-1742) and George Edwards (1694-1773) portrayed birds in this profile depiction without any elements or references to the natural habitat of the species described (Donald 44-7). In general, eighteenth century ornithological knowledge about a bird's habits and interaction with other species was limited to the observations of birds kept isolated in captivity where food was provided by the animal's keeper without their having the need to hunt or fight for food.[3] Consequently, the animal's defensive instincts were highly constrained and so what these ornithologists observed did not correspond to the animal's behaviour in its natural habitat where it was exposed to different kinds of obstacles to its survival, in particular the not always peaceful interaction with other animals. The way of life outside captivity and the different adaptive features remained a mystery to Bewick's predecessors and also to readers, who were left with a sense of artificial peacefulness that did not match the animal's struggle for survival.

Even though some of these ornithologists did, like Thomas Bewick, in fact travel to other locations in Britain to observe different bird species *in loco*, they lacked the scientific perspective and knowledge that could inter-relate the animal's anatomy and way of life to the conditions in which they lived. It was, therefore,

important to show textually and visually the ties between animals and their habitats.

Eleazar Albin and George Edwards, among other eighteenth century ornithologists and illustrators, included only small stumps and dubious hummocks where the bird was placed without any particular detail that could indicate its precise location. This view of the animal, isolated from any possible imminent peril, aimed at conveying an image of a divine harmony that was provided and assured by a generous entity that had created a space where all beings could coexist peacefully. Thus, the explanations provided by Natural Theology about the ways in which the world and its denizens were conceived functioned as necessary justification for the lack of *in loco* knowledge by ornithologists and illustrators.

In addition, this insufficient understanding of the ways different species survived in their natural environments seemed to fulfil the purpose of expanding the book market, in particular illustrated ornithological publications. In other words, the lack of information collected *in loco* by authors and illustrators made the studies more comprehensible to a younger readership as well as to individuals without any deep scientific knowledge of zoology or ornithology. The textual descriptions were necessarily more succinct and the language used was easily understandable because, in general, it did not incorporate any specific scientific terminology.

The book Jane Eyre was reading, *History of British Birds*, is a paradigmatic example of the popularity of these illustrated publications among younger readers such as Charlotte Brontë's ten-year-old heroine. One of the reasons for this success is the visual innovation Thomas Bewick introduced in this work. Although knowing that illustrations caught the attention of a younger readership, Bewick was also aware of the high cost of including a large number of illustrations. During the eighteenth century, illustrated scientific manuals used, for example, in Anatomy or Medicine lectures in university were not accessible to a wider readership owing to the high quality of the illustrations that, moreover, had to be printed on special

paper. In these circumstances, it was difficult for authors and publishers to produce a significant number of copies of the publication because this implied the risk of not selling the books. As a result, the illustrated publications were produced generally by subscription so the print run was limited to the number of subscribers.

Thomas Bewick decided to introduce a woodcut process in his *History of British Birds* that modernised and innovated the book market by including on the same page both the illustration and the textual description without any special paper being required to print the illustration as had been the case for previous expensive illustrated publications. The costs were therefore significantly reduced but the quality of the pictures did not decrease. On the contrary, throughout the nineteenth century, after the introduction of Bewick's innovative technique along with the subsequent remarkable success of his compendium, the illustrated book market adopted the same printmaking technique and these publications became considerably cheaper and more accessible to a wider readership.

At the end of the eighteenth century and especially throughout the nineteenth century, bird-watching became a popular hobby due to the public's fascination with the variety of bird species that inhabited the urban landscape in parks and menageries or in the Zoological Gardens where visitors could observe many of the birds portrayed and described in ornithological publications. These frequent visits to animal exhibitions soon became one of the habits of Victorian families who used to take their children to observe animals in captivity during the weekends or holidays. This leisure activity also had a pedagogical aim as children learned from a very young age to respect animals, to identify different species and to learn more about the food they ate and the habits of the species being exhibited. Thus many developed an interest and wanted to read more about their favourite animals, the animal kingdom in general or simply about their pets.

In this context, illustrated natural history books created a new bridge between scientific knowledge and its visual representation, which attracted many animal

enthusiasts regardless of their level of zoological knowledge. Curiously, during the Victorian age, the interest in publications about specific bird species was associated with a particular social status. Members of the country aristocracy who appreciated hunting in rural environments such as the Highlands (Mackenzie 32-3) were avid purchasers and readers of books about pheasants, partridges and ducks whereas the urban upper class preferred reading about exotic species, often imported, such as peacocks with their colourful tails, which fascinated the more modern and urban readership that regularly visited the city's parks where these species could easily be found and observed.

This clear division between different interests in specific ornithological publications, and consequently in bird species, leaves us with a relevant question: where did the Royal Family's reading interests, particularly those of Queen Victoria (1819-1901), lie? Queen Victoria was a well-known animal lover and the first Royal Patron of the RSPCA: Royal Society for the Prevention of Cruelty to Animals (Cartmill 140-2). She herself had many pets that she treated as family members, spoiling them with good quality food and commissioning portraits of them from the most renowned animal painters of the day like Sir Edwin Landseer (1802-1873), who painted two of her favourite bird species: the macaw and the lovebird. Despite this fascination with colourful exotic species like the macaw (and probably peacocks), Queen Victoria and Prince Albert (1819-1861) often visited the Highlands during the hunting season, particularly during autumn, which also made them great enthusiasts of the same bird species as the country aristocracy. As a result, the monarch's ornithological reading interests alternated between these two different types and possibly included many others because of her fascination with animals in general.

During the nineteenth century, as a consequence of the frequent expeditions undertaken all over the world for scientific purposes, visual imagery constituted a relevant source of scientific knowledge and gradually scientific publications

recognised the importance of visual representations and their direct relation to the object they aimed to reproduce. Until that time, the presentation of scientific conclusions and critical reviews in scientific publications were still dependent on textual descriptions. These recurrent expeditions during which different species were studied explained the need for a new scientific practice that Julia Voss describes as "discovery and display" (Voss 23). All the species collected needed to be further dissected, examined, classified and catalogued, but it was also necessary to understand the interplay between different life forms and how they adapted to the conditions of their natural environment. Gradually, the limited view of nature as the creation of a supreme creator conveyed by the supporters of Natural Theology like Thomas Bewick gave place to the conception of an endlessly dynamic nature where all beings were ruled by natural laws in a balance of forces and not by God.

During the second voyage of H.M.S. Beagle between 1831 and 1836, Charles Darwin's field observations of new species and their adaptive features, particularly the Galapagos finches, later catalogued by the renowned ornithologist of the Zoological Society of London, John Gould (1804-1881), played a vital part in the conception of Evolutionary thinking. Natural Theology's harmonious understanding of the animal kingdom was soon discarded by Darwin as his conception of survival necessarily implied different efforts and moments of struggle and violence that should be depicted in visual representations of each species' way of life. But the question was: how could Darwinism, controversial as it was, and its followers replace the peaceful visual representations of the natural world that delighted readers like the young orphan in Charlotte Brontë's novel? As regards the illustrations in Charles Darwin's publications, particularly those included in *The Descent of Man,* most of which were done by Alfred Brehm (1829-1884), one can understand that the way he chose was to adopt the already existing visual conventions of illustration and gradually present his new perspective on such controversial topics of Evolutionary thinking as the utility of beauty as a key aspect

of sexual selection in some species (cf. Donald and Olsén 101-117). Until that time, scientific illustrations had standardised the animals depicted in profile images and relegated beautiful plumages and particular ornaments to gifts attributed by God for the delight of humankind.

In *The Descent of Man*, in many cases Darwin adopted the profile depiction in the centre of the illustration as used by his predecessors such as Thomas Bewick, Eleazar Albin or George Edwards, but the ornaments that different bird species used to catch the female's attention were given special relevance in visual Darwinism (Picture 3). Moreover, the specimen was rarely depicted alone so as to show, in the case of sexual selection, the interaction between male and female. When the bird was depicted in isolation, Darwin's primary intention was to highlight the features of the animal's body that performed a core function during the process of sexual selection (cf. Munro 253-289). For example, in the case of the humming-bird, thoroughly studied in *The Descent of Man* and also by John Gould before Darwin, male humming-birds are described by Charles Darwin as a species that

> almost vie with birds of paradise in their beauty, as every one will admit who has seen Mr. Gould's splendid volumes, or his rich collection. It is very remarkable in how many different ways these birds are ornamented. Almost every part of their plumage has been taken advantage of, and modified; and the modifications have been carried, as Mr. Gould showed me, to a wonderful extreme in some species belonging to nearly every sub-group. […] with humming-birds, birds of paradise, &c, […] the selection [is made] by the females of the more beautiful males. (Darwin 436-437)

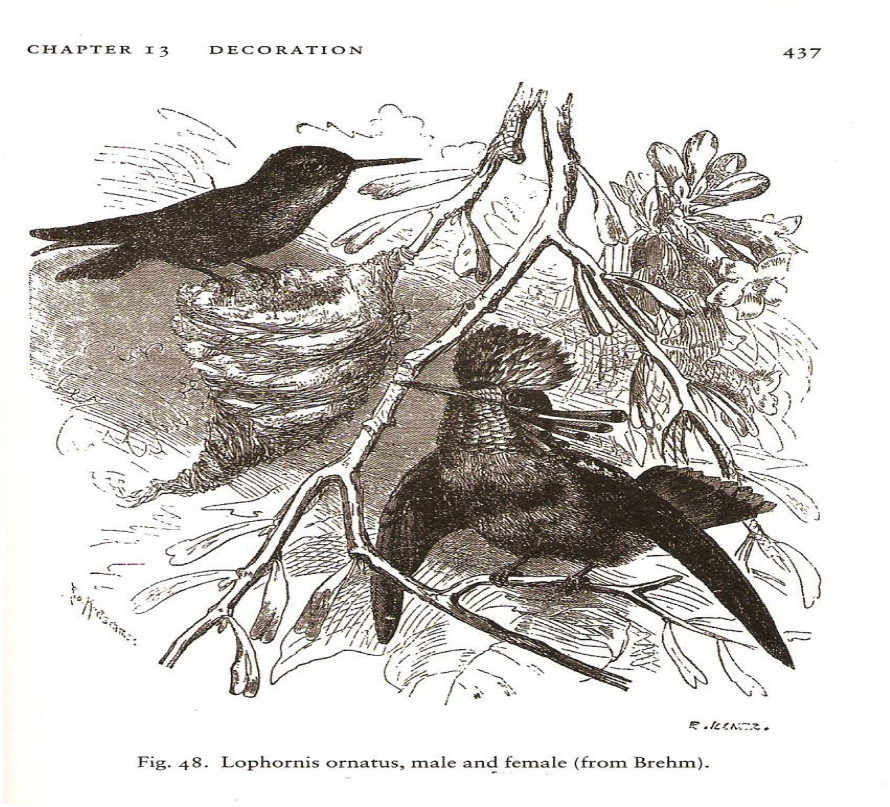

CHAPTER 13 DECORATION 437

Fig. 48. Lophornis ornatus, male and female (from Brehm).

Picture 3 - Charles Darwin, *The Descent of Man*, 1871, page 437.

As regards the environment, there are no significant changes when compared to Bewick's incipient depictions of the natural environment as Darwin aimed to emphasise not the environment itself but the adaptive features of the animal in order to explain them from an Evolutionary perspective. He also relied on textual descriptions to clarify these complex processes, mechanisms and natural laws so that readers, used to the visual conventions prior to the publication of his Evolutionary views, could follow these new perspectives of the natural world and its laws. For example, to draw the reader's attention to the influence of climate changes on the modifications of the adaptive features of the animal's body (in this case the plumage), one species Darwin described was the ptarmigan, twice depicted by the animal painter Sir Edwin Landseer before the publication of *The Descent of Man*.[4] In Darwin's words,

> with respect to the cause or purpose of the differences in colour between the summer and winter plumage, this may in some instances, as with the ptarmigan, serve during both seasons as a protection. When the difference between the two plumages is slight, it may perhaps be attributed, as already remarked, to the direct actions of the conditions of life. (Darwin 440-1)

On the whole, Darwin's adaptation of the conventions of ornithological publications prior to his own studies was a selective process since the English naturalist decided to maintain some of the features used by Thomas Bewick and his predecessors in their ornithological illustrations, such as an incomplete visual representation of the species' natural surroundings, while relying on the textual descriptions to shed light on the explanation of the natural processes. The unsatisfactory use of image in the ornithological publications of eighteenth and early nineteenth century authors was associated with a clear selection of what could and could not be depicted according to the principles of Natural Theology. On the contrary, Darwin's aim was to make use of the illustrations to highlight the importance of the animal's physical adaptive features. Up to this time, these had been considered to be ornaments offered by God for Man's delight and for the embellishment of the animal itself with no other purpose than that incipient explanation provided by natural theologians. Visually, the utility of beauty proved to be one of the most controversial subjects of Evolutionary thinking due to the careful choices that Darwin had to make concerning the representation of this new perspective on Evolutionary aesthetics and the dynamics of nature ruled by natural laws.

To conclude, the exoticism of bird species and the peacefulness portrayed in the illustrations of Thomas Bewick's *History of British Birds* were the visual representations of a harmonious nature assured by a generous divine entity that guaranteed and maintained order in the animal kingdom as was argued by natural theologians. For all those readers of illustrated natural history books, like the young

Jane Eyre, who longed to find in these readings the order and the tranquillity that lacked in their own lives, eighteenth and early nineteenth century ornithological publications were the perfect gateway as visually they did not offer any scientific explanations about the dynamics of nature. In fact, some of the answers were later provided by Evolutionary thinking which faced the difficult task of adapting the existing conventions of ornithological illustration to their own purposes. This implied acknowledging that divine creation had been a blindfold that did not allow people to perceive the natural world and its human and non-human denizens from a true and accurate scientific perspective.

[1] This paper was presented at 'Relational Forms II *Ex certa scientia:* Literature, Science and the Arts. An International Conference' in one of the two panels dedicated to works developed within the "Science & Culture in Britain (19th and 20th centuries) Project" by the "British Culture and History" Research Group of CETAPS (Centre for English, Translation and Anglo-Portuguese Studies).

[2] As Thomas Bewick recalled in the preface to the first volume of his compendium, *History of British Birds*, Buffon's studies provided fundamental new approaches to the organisation of the world and its inhabitants. Nonetheless, the English ornithologist claimed that "in many instances that ingenious philosopher has overstepped the bounds of Nature, and, in giving the reins of his own luxuriant fancy, has been too frequently hurried into the wild paths of conjecture and romance" (Bewick, I, iv). What Bewick called "conjecture and romance" were the innovative views presented by the French naturalist about the urgency to consider the influence of the conditions of the natural surroundings on the animals' way of life, anatomy and consequently their own survival and the survival of their species. Even though Thomas Bewick referred to the locations in general terms, these descriptions did not make an accurate association between the conditions of the natural habitat and, for example, the adaptive features of the animal.

[3] During the eighteenth century, there were several menageries in London, such as the Royal Menagerie at the Tower of London and at Kew and Windsor. There were also several aristocrats who imported animals from other parts of the world and maintained their private collections of animals. Before the opening of the Zoological Gardens in 1828, ornithologists, anatomists, animal painters and the public in general used to visit the menagerie at Exeter 'Change in the Strand as well.

[4] Landseer had studied the ptarmigan *in loco* on several occasions during his visits to the Highlands. As a result, the animal artist depicted this bird species in two paintings: *Ptarmigan* (1833) and, later on in his career, *The Ptarmigan Hill* (1869). In both these works, Landseer portrayed the bird with its white winter plumage so as to capture the modification that occurs in the animal's plumage in winter, changing from a brown plumage in summer to a white plumage during the cold season as a way to camouflage itself in snow and prevent an attack from a predator.

Works Cited

Bewick, Thomas. *A History of British Birds. Vol. I Containing the History and Description of Land Birds*. Newcastle: Printed by Hodgson, 1797.

---. *A History of British Birds. Vol. II. Containing the History and Description of Water Birds*. Newcastle: Edw. Walker, 1826.

Brontë, Charlotte. *Jane Eyre* London: Penguin Popular Classics, 1994 [1847].

Cartmill, Matt. *A View to a Death in the Morning: Hunting and Nature through History*. Cambridge/Massachusetts: Harvard University Press, 1993, 134-160.

Darwin, Charles. *The Descent of Man*. London: Penguin Classics, 2004 [1871].

Donald, Diana. *Picturing Animals in Britain. 1750-1850*. New Haven/London: The Paul Mellon Centre for Studies in British Art, 2007, pp. 42-50.

Donald, Diana and Jan Eric Olsén. "Art and the 'Entangled Bank': Colour and Beauty out of the 'War of Nature'." *Endless Forms: Charles Darwin, Natural Science, and the Visual Arts*. Ed. by Diana Donald and Jane Munro. New Haven/ London: Yale University Press, 2009, 101-117.

Fichman, Martin. *Evolutionary Theory and Victorian Culture*. New York: Humanity, Lavis Marketing, 2002, 13-50.

Kemp, Martin. *Seen/Unseen. Art, Science, and Intuition from Leonardo to the Hubble Space*. Oxford: Oxford University Press, 2006, 116-165, 274-297.

Knight, David. *Zoological Illustration. An Essay Towards a History of Printed Zoological Pictures*. Kent: Dawson Archon Books, 1977.

Lippincott, Louise and Andreas Blühm. *Fierce Friends. Artists and Animals. 1750-1900*. London/New York: Van Gogh Museum/Carnegie Museum of Art/Merrell, 2005, 13-29.

Mackenzie, John M. *The Empire of Nature. Hunting, Conservation and British Imperialism*. Manchester/New York: Manchester University Press, 1988, 6-54.

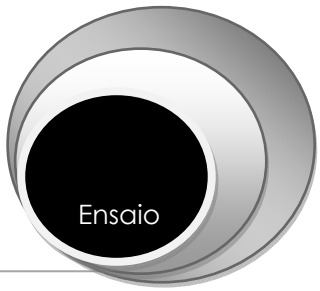
Munro, Jane. "More Like a Work of Art than of Nature': Darwin, Beauty and Sexual Selection." *Endless Forms: Charles Darwin, Natural Science, and the Visual Arts*. Ed. by Diana Donald and Jane Munro New Haven/ London: Yale University Press, 2009, 253-289.

Smith, Jonathan. *Charles Darwin and the Victorian Visual Culture*. Cambridge: Cambridge University Press, 2006.

Stafford, Barbara Maria. *Body Criticism. Imaging the Unseen in the Enlightenment Art and Medicine*. Massachusetts/London: The MIT Press, 1991.

Voss, Julia. *Darwin's Pictures. Views of Evolutionary Theory. 1837-1874*. Trans. Lori Lantz. New Haven/London: Yale University Press, 2010, 22-33.

Crime, Literature and Science in the Academic Mystery Novel



Elżbieta Perkowska-Gawlik | Maria Curie-Sklodowska University (Lublin, Poland)

Science

Among numerous attempts at defining economics as a subject of study, Yogesh Maheshwari's definition sounds most persuasive. Maheshwari claims that "[economics] is the science of choice in the face of limited ends and scarce resources that have alternative uses.' Thus, an individual, in order to maximise his or her utility, 'is required to choose best amongst the available alternatives" (1). Since economics deals with people's economic behaviour, it is sometimes called a social science, and as Maheshwari remarks "[of] all the subjects, economics is the one most closely associated with everyday lives, at all levels" (1).

The Fatal Equilibrium by Marshall Jevons deals with one of the two main branches of economics, namely microeconomics. Microeconomics focuses on the behaviour of individual households and firms, as well as on the prices and quantities of specific products. Put differently, it considers the small scale working of economic laws. Microeconomists develop models that explain how the individual parts of the market, the household and the firms, make their choices in order to spend their limited money or allocate their limited resources.

In *Fatal Equilibrium*, Marshall Jevons elucidates different economic issues, such as the market equilibrium which is inextricably connected to basic economic concepts, namely demand and supply. The reader quickly learns that different operations and transactions on the market rely on the interdependence between buyers and sellers, thus the state of market equilibrium is possible only when the

Citação: Elżbieta Perkowska-Gawlik, "Crime, Literature and Science in the Academic Mystery Novel". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 94-109. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

quantity supplied equals the quantity demanded. Undoubtedly Marshall Jevons makes every effort to present the economic theory of utility maximisation in the most palatable way. In the BusinessDictionary.com, "utility maximisation" is explained in the following way: "when making a purchase decision, a consumer attempts to get the greatest value possible from the expenditure of the least amount of money. His or her objective is to maximize the total value derived from the available money". Marshall Jevons, on the other hand, calls utility maximisation a "pursuit of happiness" and decides to enrich it with an interesting sample-analysis of cost-benefit reasoning applied to the act of book theft:

> As Oliver Wu [a distinguished Harvard sociologist] prepared to leave the library, he tried to place himself in the world of pure costs and benefits, where people responded to prices but not values – the people who inhibited the theories of Dennis Gossen. He approached the desk at the front door of Widener. Should he steal the book? (Jevons 36)

Jevons craftily analyses all pros and cons, or, using the economic jargon, the costs and benefits of stealing a book from the Harvard library by a reputable professor. As we may suspect, "the costs clearly outweighed the benefits", so having completed the decision calculus which included the pangs of conscience, the loss of reputation, "the costs of lugging the heavy volume" and the relatively little value of "a volume that bore the stamped identity of a library book", the professor decided not to violate the law. If the reader assumed that the professor must have forgotten about "the benefit of information contained in the book and possibly the pleasure of reading it" (Jevons 36) in the privacy of his home, he would soon find he was wrong. On the contrary, he took all such factors into consideration, but his meticulous analysis brought him to the conclusion that the potential book theft collides in his case with the cost-benefit calculation. The information contained in the wanted book was available to him otherwise, through the collection of the Widener located in a particularly pleasant part of the library where he spent long hours enjoying the

atmosphere of learning. He "frequented his favourite sanctuary so often" (Jevons 36) that reading the book there seemed easier than reading it anywhere else. Thus, making use of utility maximisation and applying cost-benefit calculation in pursuit of his well-being and satisfaction, the professor decided not to deprive himself of his favourite pastime, namely browsing books at the Harvard library.

Marshall Jevons not only elucidates the theory of utility maximisation, but also craftily anticipates numerous doubts the theory may evoke in the reader. These reservations are interwoven into the procedure of screening the applicants' work by the members of the Harvard Promotion and Tenure Committee. The onerous and lengthy task of perusing the candidates' files – browsing through reprints of their articles as well as external appraisals of their qualifications and scholarly achievements – is presented within the first ten out of eighteen chapters. However, only one candidate's work comes under close scrutiny, for it raises mixed feelings on the part of the members of the board. In point of fact the introduction and characterisation of the members of the Promotion and Tenure Committee at Harvard comes down to describing their reactions to economic theories applied to Dr Gossen's findings. The reader gradually finds out that most professors deprecate the young economist's reasoning for its contradicting common sense, or, at best, their own fields of knowledge. The technique deployed here by Marshall Jevons causes that a non-economist who comes across the professors' objections tends to regard these objections as rational and, considering the professional experience of the committee, hardly questionable. In other words, the reader is likely to agree with the committee members rather than the young economist's position and accordingly she or he suspects that the board will inevitably turn down Dr Gossen's candidacy.

Henry Spearman, a character whose task is to enlighten both the committee members and the reader on economic matters, is a distinguished professor of economics and the main protagonist of *The Fatal Equilibrium.* Spearman's silence

thus far was self-imposed. From the beginning of the discussion he had felt strong objections to the line being taken by Danzig and Wu. […] Vigorously shaking his head from side to side he interjected, "I beg your pardon. Excuse me! Leonard [the head of economics department], I'm very surprised that you have allowed these misconceptions to have gone on for so long unchallenged." […] Spearman knew that most economists seldom thought about the preconceptions of their discipline. "Those objections are totally without merit. And they mustn't pass without comment" (Jevons 101).

As the committee deliberates, Spearman refutes his fellow academics' arguments by providing convincing examples from everyday life. Not only does he support Dr Gossen's promotion but by the same token he propagates economic ideas among his colleagues as well as readers. Among those who voice their objections to "the computer-like rationality of Gossen's model" (Jevons 21) is Valerie Danzig, a Harvard psychologist, whose "research speciality [is] the psychological behaviour of the gifted child" (Jevons 20). She personally believes that by studying "the best and the brightest [children] … one could understand the highest forms of human behaviour" (Jevons 20) and reasoning which leads to certain decisions. Professor Danzig is not persuaded that the pursuit of maximising one's own personal utility is the main factor influencing human behaviour:

> Utility, Danzig thought, was an archaic catchall for happiness or pleasure or satisfaction or some such emotion. The term had no content. Whatever you did, you presumably maximised your utility. Did your kiss your husband or did you cheat on him? Did you pet your dog or did you scold your dog? Did you purchase a new Rolls or a used Chevy? It didn't matter! You chose whatever made you happiest. How can we tell it made you happiest? Because that's what you chose. And why did you choose it? Because it made you happy. To a psychologist like Danzig, this was reasoning in a circle. (Jevons 21)

When Professor Danzig remarks that "[e]conomists merely say that people do what they do" (Jevons 22) she expresses her conviction that Gossen and other economists practise tautology. Having heard Danzig's reservation concerning "the circular nature of economics", Professor Spearman, an economist himself, feels obliged to pinpoint mistakes in her reasoning. Spearman exemplifies his counterargument with cola and newspaper dispensing machines elucidating the predictive power of utility theory which is the core of Gossen's work. The economic knowledge that the two goods feature different diminishing marginal utility has a tremendous impact on the technologies used for the construction of their vendors.

> When soft drinks are dispensed in a machine, you can reach down and get only the one you paid for. Now let me ask you this. What happens when you buy the New York Times from a dispensing machine? You put a coin, and the entire stack of newspapers is exposed. One hypothesis that would explain this is that purchasers of soft drinks are less honest than purchasers of newspapers. But that doesn't seem right since they are often the same people. If I were a betting man, I'd place my money on a utility hypothesis. (Jevons 104)

Professor Spearman points out that a particular issue of a newspaper, unlike a bottle of coke, which can be stored and enjoyed in a year's time, has a very rapidly diminishing marginal utility. Having taken one copy of an issue, you hardly feel any satisfaction by taking another one, thus it may be safely assumed that you are unlikely to take more than one copy for the same coin. Consequently, coke vendors have to be more complicated mechanisms, in order to stop people from "getting more than one container unless [they] pay for it" (Jevons 104) Spearman successfully argues that utility theory can predict or in some cases influence the way different commodities are sold.

The reader of *The Fatal Equilibrium* also learns that the economic theory of utility maximisation is strictly linked to the search theory – the interdependence between both is revealed by the research on information in labour markets.

> People seeking occupations where employers offer a wide variety of wages for the same work will find it to their advantage to search longer and harder for the job. Why? Because the worker knows that the next job interview may entail a salary higher than offered at the last interview. Where employers are all offering similar salaries, the chance that a person will be offered a higher paying job at the next interview is [small]. And since the cost of searching would be the same in both [situations], workers will look longer for jobs where wages are not so closely bunched. (Jevons 5)

Although that cost of a longer search for a higher paying jobs seems to be obvious, Spearman points out to its 'not-so-obvious consequence,' namely that there are more unemployed where the wages offered for the same job are more diversified, since people hoping for getting a better paying post will tend to reject even objectively decent job offers.

The Fatal Equilibrium craftily combines the search theory with the economics of information and such vital issues as the optimal number of brands, advertising and influence of competition on prices. This time it is the figure of Sophie Ustinov, a professor of chemistry, who instigates the controversy and thereby acquaints the reader with a few important facts about economics. Professor Ustinov questions Dr. Gossen's hypothesis that a consumer can benefit when the market generates the so-called "optimal number of brands" (Jevons 74). She refers to examples such as bleach, evaporated milk or aspirin, just to name a few, which are commodities sold under numerous brand names, although they are chemically identical. Her stance on the issue of the optimal number of brands is reduced to the statement that if the products do not differ in their composition "[one] brand is all you need" (Jevons 74).

Moreover, Professor Ustinov accuses Gossen of ignoring the possible savings that could be made if producers did not waste money on advertising campaigns.

> 'But Professor Spearman, whenever you have this variety, this differentiation, you have companies advertising each brand. And advertising has its costs. Let me ask you this. How much less would I have to pay for something if it weren't advertised, if there weren't the different brands that this young man' – here Ustinov held up Gossen's stack of papers – 'applauds? I ask you now. How much less?' (Jevons 105)

Sophie Ustinov is absolutely positive that depletion of the variety of brands and costs of advertising in the process would inevitably reduce the price of goods. Therefore, she is amazed by Professor Spearman's response that she would, in fact, pay more. Surrounded by people whose way of reasoning is similar to that expressed by professor Ustinov, Henry Spearman is well-aware that he has to elaborate on his surprising response. In fact, the astonishment of Spearman's academic colleagues is necessary to give Marshall Jevons another opportunity to teach economics through his protagonist:

> 'Advertising is a cost of doing business. Let's be clear on that. But advertising also informs us of other alternatives. It gives us more information about what's being sold in the marketplace and about availability of competing products.' Here Spearman pointed to the ceiling with his index finger, a gesture his students knew was associated with a conclusion. 'So competition is increased by advertising, and the result is lower prices for customers, not higher.' (Jevons 107)

As some academics signal that they are not entirely convinced, Spearman decides to clarify the matter further and states that "the branding of products [and by the same token advertising campaigns] gives manufacturers incentive to maintain high quality" (Jevons 108). Put differently, were there no different brand names of similar commodities, producers would not feel obliged to "maintain quality control"

(Jevons 108), since their most effective way of influencing consumers' choices would disappear.

Acquainted with the microeconomics theories, the reader is now able to find a rational explanation for different consumer behaviours. In other words, it is no longer a *mystery* why people are apt to search long and hard for an expensive item in the family budget neglecting the fact of closely bunched prices. Although not equipped with any additional graphs or tables, Marshall Jevons' explanations are so clear and well-illustrated with numerous examples that even a non-economist can comprehend them quite easily. As the reviewer John Haring said in the *Wall Street Journal* about Marshall Jevons' mixture of fiction and economics, "if there is a more painless way to learn economic principles, scientists must have recently discovered how to implant them in ice cream" (Haring 8).

Literature

The Fatal Equilibrium by Marshall Jevons is a postmodern academic mystery fiction,[1] which deploys numerous conventions of both the classical detective novel and the campus novel. The novel introduces three puzzling deaths simultaneously illuminating the vital issues of the contemporary university, namely the policy of 'rationalisation', university career and often unscrupulous 'fight' for tenure. Although academics represent the fixed array of types required by the classical detective convention, namely the amateur detective, the victims, the suspects and the criminal, they are constructed more in line with their functions within the university than according to the strict rules of the detective formula. The academic character of *The Fatal Equilibrium* is enhanced by the discourse, especially the economic one, which seems to be typical more of a student's textbook than detective fiction. As far as the setting is concerned, the Harvard campus, like all university campuses, is a self-evident place for the academic novel, yet it also

perfectly meets the requirements of the detective fiction convention, for it exemplifies a restricted area with a limited number of suspects.

In *The Fatal Equilibrium*, the action involves the deliberations of the Promotion and Tenure Committee, whose task is to decide which of the university departments has put forward the candidature of the most promising scientist. As the stake is the tenure at Harvard – a rarely practised type of employment at the Ivy League universities – there is a heated debate among the fictional committee members. They are specialists in different fields of science, such as psychology, mathematics, sociology, chemistry, anthropology, economics and classics. The subject of much controversy is the candidature of a young economist, David Gossen. Much as Gossen's scientific accomplishments are daringly defended and elucidated by Henry Spearman, the economics professor and the main protagonist of Marshall Jevons' novel, Gossen's application for tenure is eventually rejected. Spearman's only success is that the decision is not taken unanimously. Nevertheless, the final score is 3 to 4 against Gossen's promotion, with the Dean Clegg "in the role of tie breaker" (Jevons 113). The very next day after the committee meeting, Gossen commits suicide – or at least this is the version of events officially adopted by the police and academics. Henry Spearman learns about this tragic event from Leonard Kost, the head of economic department.

> 'The Dean's office just called me, and I don't have details. But someone found him in his car early this morning. He committed suicide. Carbon monoxide poisoning. He had a hose from the tail pipe running into his car. Dennis was dead when they found him. The police discovered a short suicide note in his typewriter at his home. It was beside the letter turning him down for promotion. I had planned to call Dennis in today, to talk about his future plans, and naturally to tell him I was sorry about committee's decision. Of course, I had no idea he'd take the decision this way. I couldn't have, could I?' (Jevons 119)

However, despite police revelation concerning Gossen's suicidal death, the reader – and only the reader – knows that Gossen was actually murdered. Marshall Jevons's novel contains a "fore-chapter", metafictionally entitled "Flashforward. Thursday, January 10". Here the reader learns that on 10 January (the day after the committee meeting), Gossen, in an excellent mood, was waiting for somebody to celebrate his promotion to Harvard with. However, his guest turned out to be an enemy since he killed Gossen with a fatal injection.

The book cover says that *The Fatal Equilibrium* is a whodunit novel. However, as the characters are unaware that an act of homicide was committed, there is no reason for them to suspect anybody or call for a detective to investigate the crime. The atmosphere at university is getting denser and denser, because two professors who rejected the young economist's application are murdered, and consequently the other two who also voted against Gossen's promotion are afraid for their lives. Surprisingly the peace of academia is quickly restored as the police without much effort find the culprit, who turns out to be Gossen's girlfriend. A trial for murder does not abound in unexpected revelations, so she is found guilty and sentenced to imprisonment for life.

If it were not for two other murders committed on the committee members who voted against Gossen's promotion, we might wonder whether Marshall Jevons expected the reader to perform the role of the investigator. The idea of the reader who actively participates in the process of detecting crime is in conformity with "the detective story as 'a kind of intellectual game'", which was proposed by S.S. Van Dine in his outline of "Twenty Rules for Writing Detective Stories" (*apud* Scaggs 37). And indeed, *The Fatal Equilibrium* possesses the "clue-puzzle structure […] '[that invites and empowers] the careful reader to solve the problem along with the detective'" (Scaggs 37). However, more than in the process of investigation, Marshall Jevons tries to engage the reader in the process of economic reasoning, which turns out to be helpful in detecting the true culprit.

The fact that seems to be surprising to the avid mystery reader, who is used to certain mystery formulas, is the lack of engaging crime investigation. Till the last three chapters of *The Fatal Equilibrium* no character is assigned the role of a clever amateur sleuth who could outwit an official investigator. In fact, the announcement of the solution coincides with the moment of revealing the identity not only of the murderer but also the sleuth:

> [Spearman] opened [the book] to the place where he had left off and found himself looking at material that promised interest to an economist. […] As he read he felt a twinge of annoyance. Something didn't make sense to his well-ordered mind. […] He looked back at a page…and then another. … Could it be? […] It was as if the pieces of a great jigsaw puzzle that at one time had seemed intractable now come together into sensible pattern. Every piece fit together. […] And he knew who the murderer was. (Jevons 181)

The role of the detective is to be performed by the main protagonist Henry Spearman, an economics professor. It is not a surprising choice: while reading the novel one is consistently exposed to his impressive way of logical reasoning, even though it refers to economic matters, not criminal ones. At the climactic moment, which is "the detective's calm announcement that he has arrived at the solution", Marshall Jevons puts the equals sign between "the action of classical [detective] story [focusing] on the investigation of mystery" (Cawelti 87) and Spearman's lectures and elucidations of economic theories, which eventually lead to the solution of the criminal puzzle:

> The identity of the murderer did not come as a kind of visceral realization. [Spearman] knew it as a matter of impeccable logic, a logic that flowed from one of the most firmly entrenched principles in all of economic analysis: consumers maximize their utility. The reliability of that proposition and its amazing predictive power had been demonstrated over and over again in so many ways that it was one of the basic building blocks of correct reasoning in Spearman's discipline. But what he had just read were statements, claiming

> to be factual, that completely contradicted this powerful economic generalization. (Jevons 181)

The reader easily accepts the fact that Spearman's academic interests and devotion to his work, as if naturally, put him in the role of the detective. Analysing the monography of his friend Dean Clegg, he notices evident inconsistencies in "Clegg's claims about the prices of goods in the Santa Cruz Islands" (Jevons 190). Spearman comes to the conclusion that Gossen (the first victim) must have noticed that Clegg's data go against the predictions of the theory of utility maximization. Spearman is petrified when he realises that the hideous triple homicide (two members of the Promotion and Tenure Committee) must have been committed by the reputable Dean Clegg, who did not want to let the young researcher ruin his well-established academic position.

The denouement is usually the last phase of the classical detective formula. As Cawelti puts it, '[here] the detective discourses at length on the reasoning that led him to the solution and reveals just now why the crime was carried out" (88). In *The Fatal Equilibrium* the denouement consists of two parts: one is Clegg's letter to Spearman, in which he reveals his motives and asks Spearman to take care of his wife after his suicidal death, the other is Spearman's lecture given to fellow academics, in which he explains his reasoning which eventually led him to revealing the identity of the true culprit.

Education

Marshall Jevons is the pen name of two co-authors and renowned professors of economics, William Breit and Kenneth G. Elzinga. Professor William Breit, who died in 2011, until his retirement in May 2002 worked at Trinity. Prior to coming to Trinity University, he was on the faculty of the University of Virginia (1965-83) and Louisiana State University (1961-65). Among other things, he taught the History of

Economic Thought and Antitrust Economics. He also established the Nobel Laureate Lecture Series, which has brought 17 Nobel economists to campus and whose talks form the basis for the MIT volume, *Lives of the Laureates*.

Kenneth G. Elzinga is the Robert C. Taylor Chair in Economics at the University of Virginia. "Each fall, Mr. Elzinga's introductory economics course attracts over one thousand students and is the largest class offered at the University of Virginia. His Antitrust Policy seminar, which is taught using the Socratic Method, often, has a waiting list of two years" (Jevons, Official Website n. pag.). Currently, Professor Elzinga runs two courses at the University of Virginia: Econ 2010 (Principles of Microeconomics) and Econ 4200 (Antitrust Economics). In the syllabus for Econ 2010, *The Fatal Equilibrium* is on the list of required material. In a short note to his students Profesor Elzinga cites John Maynard Keynes, who wrote: "The theory of economics does not furnish a body of settled conclusions immediately applicable to policy. It is a method rather than a doctrine, an apparatus of the mind, a technique of thinking which helps its possessor to draw correct conclusions" (Jevons, Official Website n. pag.). Having read *The Fatal Equilibrium* it is not difficult to believe that the above words are Profesor Elzinga's motto, as the whole novel focuses on teaching the potential reader the economic way of thinking.

Breit and Elzinga's penname – Marshall Jevons – is not accidental as it comprises two surnames of famous economists, namely Alfred Marshall and William Stanley Jevons. Marshall's *Principles of Economics* (1890), was the dominant economic textbook in England for many years. He is known as one of the founders of economics. Jevons was a British economist and logician whose *The Theory of Political Economy* (1871) is the beginning of the mathematical method in economics. And thus *The Fatal Equilibrium* may be regarded as a tribute to the famous scientists, who, among other things, dealt in their studies with the utility theory so comprehensibly presented in the book. Simultaneously *The Fatal Equilibrium*, a mystery novel, is recommended as a supplementing reading for

microeconomics courses as "the economic principles found on its pages are explained through the novel's story in a way that complements these principles as they appear in a textbook" (Jevons, Official Website n. pag.). The popularity of *The Fatal Equilibrium* is confirmed by the fact that the novel is now in its 27th printing.

The Fatal Equilibrium, together with the other two mystery novels by the same authors entitled *Murder at the Margin* and *A Deadly Indifference* (all three featuring Henry Spearman as the main protagonist) has its official website. Marshall Jevons' official website not only gives information about the authors and summaries of the mysteries, but also provides instructions for teachers of economics. Since *The Fatal Equilibrium* may be used as a course book for microeconomics, the authors prepared a great number of interesting "questions for discussion" concerning such issues as the law of demand, lost opportunity cost, cost-benefit reasoning, marginal utility, labour theory of value and many others.

However, the most intriguing aspect of *The Fatal Equilibrium* as a postmodern manual for students of economics is the fact that the book can also serve as an introduction to detective fiction. For the authors assume that prior to their reading, students of economics should be provided with fundamental characteristics of classical detective formula. According to Breit and Elzinga's guidelines, teachers should "explain to students [of economics] that reading authors of British traditionals, like Dorothy Sayers or G.K. Chesterton (to cite two of Jevons' favorites) or the widely read works of Agatha Christie requires a certain mindset" (Jevons, Official Website n. pag.). The authors of *The Fatal Equilibrium* believe this procedure to be essential for students to comprehend "a game [that] is being played between the author and the reader [and this] game is the most fundamental characteristic distinguishing a mystery from other works of fiction" (Jevons, Official Website n. pag.).

In his article entitled "Half a Mind Is a Terrible Thing To Waste", Professor Alan Brinkley claims that "the idea that we must choose between science and

humanities is false" (48). By expanding the canon of the so-called "science in fiction", whose main intent is "to explore in fiction the ideas and issues that shape the world of science" (Kramer 299), *The Fatal Equilibrium*, an interdisciplinary postmodern work, debunks a false belief that science and literature are worlds apart. The mystery novel discussed by the two economists clearly shows that science and literature can only gain from textual co-operation: economics gains new channels to propagate its ideas, whereas the mystery novel conventions are dynamised and enriched by the pedagogy of economic theory.

[1] The following references suggest that academic mysteries constitute a well-established subcategory of mystery fiction:

- In *The Mammoth Encyclopedia of Modern Crime Fiction* (2002) academic mystery is classified as a very broad subcategory of mysteries, in which the amateur detective is a professional in his or her own field of study, namely medicine, chemistry, literature etc, with Dr. Watson as their distant predecessor.

- The Webside for Fun of Mystery Novels adds that academic mysteries are defined as mysteries with a connection to an academic profession and/or academic setting, including institutions and towns where such schools are located.
<http://www.historyofthemystery.com/suggested_reading.php?page=43>

- In his annotated bibliography entitled *Academe in Mystery and Detective Fiction* (2000), John E. Kramer presents summaries of 483 college mysteries, which were published between 1910 and 1999.

- Volume 12, No.4 of *Mystery Readers Journal* (Winter 1996-1997) issued by Mystery Readers International is entirely dedicated to academic mystery fiction.
http://www.mysteryreaders.org/Issues/Academic.html

5. The Winter Park Public Library in Florida created a special online catalogue entitled "Academic Mysteries" which provides detailed information concerning academic mystery novels. Moreover, the catalogue divides academic mystery fiction into two subcategories: Single Titles and Series.
<http://www.wppl.org/resources/RecReading/Mysteries/Academic.html>

Works Cited

Brinkley, Alan. "Half a Mind Is a Terrible Thing To Waste." *Newsweek*, November 23 (2009): 48.

BusinessDictionary.com. ["utility maximisation"] Web. 9 Oct. 2012. <http://www.businessdictionary.com/definition/utility-maximization.html>

Cawelti, John G. *Adventure, Mystery, and Romance.* Chicago: The University of Chicago, 1976.

Haring, John. "Henry Spearman, the Chicago Sleuth.". *Wall Street Journal* 18 Aug. 1978: 8.

Jevons, Marshall. *The Fatal Equilibrium*. New York: Ballantine Books, 1986.

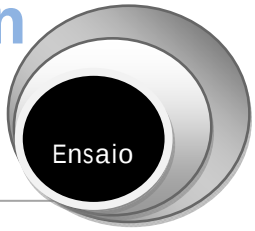
---. Official website. <http://marshalljevons.com>

Kramer, John E. *Academe in mystery and detective fiction: an annotated bibliography.* (Lanham, MD: Scarecrow Press, 2000.

Maheshwari, Yogesh. *Managerial Economics 2Nd Ed*. New Delhi: Prentice-Hall of India Private Ltd., 2005.

Scaggs, John. *Crime Fiction*. London: Routledge, 2005.

Science and Discourse, Acculturation and Schizophrenia in the Literary Work of Singaporean Author Catherine Lim



María Concepción Brito Vera | La Laguna University
(Tenerife, Spain)

> Science without religion is lame, religion without science is blind, said Einstein who had a lifelong terror of losing the spirituality for the materiality. But science and religion without the arts would be deadly dull.
>
> Catherine Lim, *Unhurried Thoughts at my Funeral*

That there is some kind of relationship between science and literature could be considered a truism among those scholars who are interested in the association between these two bodies of knowledge. The aim of this paper is to add to this relationship by briefly analyzing the interconnectedness between science and literature in the literary works of Singaporean writer Catherine Lim.

Although Catherine Lim was born in a little Malaysian village in 1942, she has developed her writing and professional career in Singapore, once forming part of Malaysia but now an independent city-state and international business center. She has written many short stories and novels about life in this little island, most of which revolve around the differences between East and West. In fact, her works abound in dichotomies of many types, the above mentioned is probably the most outstanding dyad but other pairs such as tradition versus modernity or women's rights versus patriarchy can also be found in her writing. *Little Ironies. Stories of Singapore* (1978) can be considered a landmark in her literary career as it was the first collection of short stories in English to be published by a single author.

Citação: María Concepción Brito Vera, "Science and Discourse, Acculturation and Schizophrenia in the Literary Work of Singaporean Author Catherine Lim". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 110-124. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

Catherine Lim is considered the doyenne of Singaporean literature and her books have been published in many different languages.

To describe Catherine Lim's relationship to science one could begin by defining her as a woman with many interests including literature, the arts, religion, politics and science. Her many and various concerns, together with her enthusiasm when dealing with them, relate her to the prototype of the universal artist of the Renaissance. Such a comparison should not imply that an equation between Lim and Leonardo Da Vinci, for example, is intended but somehow, in a humbler way, Catherine Lim presents the characteristics that have been assigned to this prototype of universal artist. Catherine Lim is a universal woman in a certain sense. Although she has no special invention of her own, she certainly moves and shows interests in different fields of knowledge. She is a writer and loves literature; she also holds a PhD in applied linguistics and praises herself for being attracted by the sciences which she uses quite frequently in her artistic works. She considers herself a positive person in search of truth and justice to the extent of being censored in parliament by the political party which, without a break, has ruled Singapore since 1965. She disapproves of dogmatisms and places human values above any other kind of considerations. If stating that she is a Renaissance or universal woman could be pretentious, this description could undoubtedly place her under the heading "humanist", in the sense of someone interested in all aspects related to humankind. This universality of her engagements makes it no surprise to find numerous references to the sciences in her work. However, this fact, which could be a characteristic of any artist with various interests, assumes in Catherine Lim a special meaning due to her double or hybrid identity as a postcolonial writer.

My point of departure is the consideration of science as a Western discourse, that is to say, as a way of knowing imposed on colonized peoples by the West. In this dimension, science has worked as a discursive formation stemming from the discourse of Orientalism, as described by Edward Said (1978). As it is well known,

Orientalism can be defined as a set of statements about the East put into circulation by the West in order to exert power and authority over its colonies. Although it reached its peak during the 19th century and the first half of the 20th century, this set of statements and preconceptions can be said to be still in circulation under the form of stereotypes or commonly held assumptions about the East. Homogenization, binary categories and repetition are the basic tools by which Orientalism operates. Homogenization implies reducing all Eastern or Western peoples to single and unified categories which can then be opposed to form binary categories. This implies defining one of the terms of this set, the East, in relation to the other, which becomes then the privileged term, the one against which the Other is measured and defined. Thus, the East, reduced to a monolithic and essentialized category, is described as the negative image of the West. Repetition transforms these sets of statements into stereotypes which through their sole reiteration by institutions with authority acquire the status of truth. Said derived his concept of Orientalism from Foucault's notion of discourse in *The Archaeology of Knowledge* (1972).

Science, with its aura of objectivity, is considered here as forming part of the discourse of Orientalism. Being based on observation, measure and experimentation, science seems to have acquired a truth value that is not to be put into question. Its claims of objectivity place it outside the realm of subjective thinking, traditionally assigned to the humanities. Its asseverations are truths in themselves, science stands independently from the observer that applies its principles, it aims at objective truth and its conformity to reality is beyond discussion by other fields of knowledge. Scientific laws are by definition general and universally applicable. However, such a truth status on the part of science has come into question as the concept of reality has also been contested by philosophy and the social sciences. Thomas Kuhn's (1970) notion of paradigm, advanced to explain the ways in which scientific shifts take place, worked as a first step in the

conception of science as constructed knowledge. Envisaging this field of study as a discourse is of special importance in the social sciences as it emphasizes neither the validity of scientific knowledge nor its suitability to explain reality but it allows for inquiries on its role as a bearer of cultural values. Conceiving of science as a discourse stresses its capacity to determine our way of perceiving reality. That is, if the power of science to establish truth cannot be rejected, the ways by which these truths are arrived at are, however, constructed. I embrace George Levine's assertion that, "literature and science, whatever else they may be, are models of discourse" ("One Culture: Science and Literature" 3) and that science "works within the culture and responds to its exigencies" (*Darwin and the Novelists* 3). Consequently, it can be regarded as a product emanating from culture while simultaneously contributing to define it. In Robin Gilmour words, "the issues of science, the questions it asks and the way it chooses to answer them, cannot be separated from the assumptions of the culture at large" (142). But the purpose of this paper is not to uncover fissure lines in this body of knowledge. What I intend is to point at the role of science in the literary works of Catherine Lim and to illustrate how it has operated, to some extent, as an acculturating device, as a Western discourse, determining her understanding of "reality", her culture and herself. Logically, her production as a literary writer is also influenced by the regulating activity of science as a discourse.

This paper will proceed according to the following lines. In the first place, taking science as a deeply embedded element in Catherine Lim's works, I will illustrate how it has paradoxically operated as a liberating frame unfettering her from the constraints of tradition. This is science in its role as a truth generating device. In a second step, I will display some examples of the role of science as a source of metaphors by which any aspect of life can be interpreted and explained. The pervasiveness of science as a system to understand and grasp her universe will thus be exemplified. In the third place, I intend to correlate the role of science with Western thought and its influence on colonized peoples. The double influence of

native culture or tradition and modernity or the West, determine the generation of a certain type of schizophrenia in the colonized subject. Science in its discursive dimension has largely contributed to this process. Lastly and as a way of synthesis, Catherine Lim´s personal cosmology, which can be read as a sort of negotiation between the two cultures that constitute her heritage, will be advanced.

For Catherine Lim, science provides human beings with the power of reason above superstition. In her case, reason plays a very important role as it does away with those superstitious beliefs that held women in a position of subordination. For instance, in her short story "Of Moles and Buttocks" (1983), Lim describes how moles near the eyes of women were considered a sign of sorrow and tears whereas those near the mouth meant prosperity and food always at hand. Women with flat buttocks, on the other hand, were bad luck bearers while round fleshy buttocks denoted prosperity and a happy life. More superstitions said that a black cat at a funeral would raise the dead from their coffins and the ghosts of recently deceased people, especially if they had suffered in life, could provide the lucky lotto numbers to those who dared to perform the right ritual on their tombs. Against these beliefs, Catherine Lim yearned for a type of truth which were, "earned only through the hard work and research of science" but even empirical truths had to be revised if, "new evidence warrants it" (*Unhurried Thoughts* 72).

Native superstitious beliefs seem to have exerted the same type of fascination on the writer as on a foreign reader, but some of them, especially those dealing with women, acted in her life as constraining elements forcing her to accept her place in a patriarchal society. Science and rational thought, however, allowed the author to vanquish the superstitious fears under which she was brought up. Those beliefs were designed not to protect and satisfy one´s needs but, on the contrary, they were useful tools to impair the subject´s capacity to grow as a free individual. In *Unhurried Thoughts after my Funeral* (2005), Lim recalls a situation that definitely led her to abandon those ancient fears. As a child, she was told that ghosts lived in

the trunks of banana trees so that if they were slashed at night a scream would be heard:

> I secretly put the belief to the test one dark and moonless night, but heard no scream. Later, I was told that the horrible wailing sounds I could hear from the lunatic asylum […] were caused by the full moon. In a visit to the asylum with my mother […] I realized that the cause of the agony of these poor women was not the moon, but the wretchedness of their lives. In adulthood, I became suspicious of supernatural phenomena presented as facts. (*Unhurried Thoughts* 72)

In her works, her characters can sometimes break free from these constraints, in other cases they fall victim to these superstitions but most of the times they show a combination of these trends working simultaneously, conferring them a schizophrenic personality. Thus, for instance, the modern, Western hugging and English speaking woman in the short story "Or Else the Lightning God" (1980) cannot stand her mother in law and forces her to move to some other relative's house. The old lady, who did not like this disobedience and lack of respect to traditional values, curses the young woman. Notwithstanding all her modernity and self-sufficiency, she suffers a nervous breakdown after being sent the curse of the Lightning God. Ironically, she will only recover if her mother in law agrees to perform a forgiving ritual on her behalf. Angela, the protagonist of Lim´s first novel *The Serpent's Tooth* (1982), is another example of cultural schizophrenia as she is also a very modern woman who, again, cannot free herself from ancient fears which reappear in her life as nightmares due to her lack of filial piety, one of the most treasured Chinese values. Although she ignores and even despises traditional ways of knowing, she cannot completely disregard her native culture. Thus, when problems in her marriage arise, she goes to a very expensive astrologer and if her business is not running well she turns to a geomancer in search of advice. The reliability of these characters is explained through their expensive fees and Western

looks. The geomancer, for instance, is described as someone, "you wouldn't know he was a geomancer. We tend to think of these people as old and weird-looking. He is always impeccably dressed in suit and tie" (*The Serpent's* 112). For Angela, there is no possibility of reconcilement between her two cultural legacies, as she superficially embraces modernity.

From what we have seen above, science works as a liberating and truth providing element in the works and life of the author but contact with this foreign way of explaining and understanding the world is also the source of contradictions and irrational fears in the mind of the characters. Being science such an important aspect in the life of the author, it is not surprising that it may permeate her works constituting a sort of metaphor providing device by means of which human beings and the world around them are explained.

A good example of this metaphor providing role can be found in her fourth novel, *Following the Wrong God Home* (2001). Ah Heng Cheh is an old Chinese born servant who is disoriented with the changes brought about by modernization in Singapore. Such disorientation is conveyed by means of her unsuccessful search of a place for her God, a statuette of an ancient Chinese deity. Yin Ling, the girl she once helped to raise, is now a young woman who worries about the welfare of the old lady and has come to take care of her. She studies literature at university and enjoys writing poetry as a means of expressing her inner feelings. She dedicates the following poem to the old servant:

> Strange, lost god
> A neither-here-nor-there god
> Under the snub nose and child´s cheeks
> Is there a Sky-God´s visage
> Too terrible to behold?
> Strange, lost god
> Come off it, I say,

Stop being victim of
The Uncertainty Principle
Take on the certainty of
A particle or a wave
End Ah Heng Cheh´s pain
And mine
And show us the way home
(*Following* 66)

In this poem, the superstitious fears from which the protagonist has tried to break free are clearly portrayed through the reference to the menacing Chinese deity Sky-God, who is disturbingly linked to the innocent and affable statuette belonging to Ah Heng Cheh. However, I would like to highlight the reference to Heisenberg´s uncertainty principle, which is here utilized as a symbol of the dual or hybrid condition of the postcolonial subject. Thus, just as matter may be described as sharing the properties of a particle or a wave depending on the type of physics we apply, so the subject who has undergone colonization shares characteristics of the two cultures which comprise her heritage. Her Chinese ascendancy is on the side of tradition. It represents the culture of her parents and grandparents. It constitutes an intimate aspect of her personality that contains many loved things: childhood memories, festivities, customs, family meetings, dresses, foods. These loved aspects coexist with others not equally loved such as the already mentioned superstitions. On the other side of the same coin stands the author´s British education at a Catholic school. There she was taught English literature, history and science. Thus, British culture came to be associated with scientific thought and reason. However, these same Catholic nuns that taught her the principles of science imbued her with other superstitions such as the fear of God or the punishments in Hell:

> The escape from the strictures of cultural conservatism into Western enlightenment through an English education proved to be no escape but the embrace of a different set of strictures. The years as a Catholic under the tutelage of devout convent school nuns could be alarming for a young teenaged girl who was continually reminded […] of the awful punishments in hell awaiting those who committed mortal sin. (*Unhurried Thoughts* 70)

Going back to this idea of science as a metaphor providing device, Catherine Lim uses images related to the different bodies of science. Thus, physics also come into play when the author tries to explain her restlessness:

> The stern Confucian voice followed me relentlessly throughout my life. I grew restless with the need to escape the voice, justifying my recalcitrance with the reminder that my condition was merely exemplifying a basic law of Physics that describes the fundamental restlessness of matter thus: 'The more a particle is confined, the faster it will move around.' (*Meet me on the Queen Elizabeth 2!* 8)

When she wants to state that middle aged women travelling on a cruise still have some opportunity for romance, she uses Einstein's relativity theory, "I told friends that on the QE2, I saw a special application of Einstein's Law of Relativity which was totally agreeable to me: in her fifties or sixties, a woman was relatively young among septua-, octo- and nonagenarians" (*Unhurried Thoughts* 59). To explain why the protagonist in the short story "The Paper Women" (1993) has failed in her role as wife the author turns to Medicine and Biology:

> I wished though, that other problems in our marriage could have been just as easily solved. Consider: Husband gets angry because Wife is showing too much interest in her career. Wife goes for operation to remove 'Career Gland'. Husband complains Wife does not love him, Wife goes for operation to put in 'Love Husband' gland. (*The Woman's Book of Superlatives* 20)

Science in Lim's work is not merely a conversation topic but something that oozes her work as she depends on it to explain and understand her world. Lim's double identity is constantly present in her works and can be traced both through the contradictions her characters undergo and through the author's own memories and statements about her education. This confluence of two cultures that mutually exclude each other gives way, as we have seen, to guilty feelings in her female characters. In her works, she puts these cultures under the microscope to test their validity. For instance, the girl child Mei Kwei in *The Teardrop Story Woman* (1998) grows up as a Chinese girl while simultaneously receives a Catholic education. Confused as to the deity she can trust, the Virgin Mary or Kuan Yin, the Chinese Goddess of Mercy, she decides to put the two of them to proof. Having lost a small amount of money in her way to school, she prays to both deities, first to Virgin Mary and then to Kuan Yin. It is this second deity that works the miracle and Mei Kwei finds the lost money. This is a common feature in Lim's writing: her characters usually show respect for traditional beliefs while they fall victim to them.

One could say that this is one more example of superstition put to work, however, the method used by the girl to decide which deity to believe in presents some hints of the scientific method, that is, the option chosen by the girl is determined by "palpable" and "measurable" experience. Being it an example of superstition or not, what can be stated with some certainty is the close relationship between science and the world of the colonizer in Lim's works.

Throughout this paper, I have emphasized the relationship between science and the West together with the difficulties brought about by the coexistence of traditional and Western values in the author. Now I will try to give some reasons leading to the consideration of science as a Western discourse.

In his study of British colonization in India, Partha Chatterjee states that, in order to protect indigenous identity, Indian nationalism conceived of culture as separated in two spheres: the material and the spiritual (1993 6). Western

superiority in the material sphere was unquestionable as was Indian superiority in the spiritual one. If India wanted to overcome colonialism it should embrace Western knowledge in the field of technology and science while it was also a priority to protect India's identity in its spiritual dimension. Consequently and due to their relationship with the home and their role as culture bearers, women were denied access to the values represented by the West. The division of culture into two separated spheres implied the coexistence of two separate value systems under one single culture. This dichotomy has been analyzed by R. Radhakrishnan (1992) as an example of schizophrenia on the part of the colonized that had women as its main victims, "Unfortunately, in authorizing such a schizophrenic vision of itself, nationalism loses on both fronts: its external history remains hostage to the Enlightenment identity of the West while its inner self is effectively written off out of history […] And Woman takes on the name of a vast inner silence" (84). This vision of culture leads the colonial subject to an unbearable split which is also traceable in the work of Catherine Lim. The question is then to what extent the subject can adopt such a powerful weapon to build knowledge without undermining their own native capacity to understand and perceive the world, that is, without undermining the subject's own *Weltasnschauung*.

Throughout this paper I have dealt with science as a discourse and I have opposed it against tradition or native knowledge to illustrate how it has determined Lim's perception and understanding of her world as it is displayed in her writing. In so doing, however, the same pattern that can be identified in Orientalism has been applied. Firstly, all scientific knowledge has been subsumed under the category "Western" while native knowledge has been reduced to superstitions. That is, in my dealings with these forms to know and perceive the world I have contributed to the consolidation of science as a Western discourse. I have homogenized, then opposed and transformed into a binary category these two ways of perceiving the world. Hence, answering the question previously posed becomes a difficult task as the

researcher is also immersed in discourse. A usual resource in the humanities consists of trying to blur binary categories by emphasizing the borders or the spaces in between. For instance, not all scientific knowledge is impartial or even "Western" as not all native knowledge can be reduced to "superstitions" suffering from a lack of empiricism. An example of an attempt at reconciling this dichotomy between native and scientific knowledge can be found in Glen Aikenhead and Masakata Ogawa's investigation on science education to native communities (2007). In this study, they try to soften this division by postulating a third way of knowing that would share from both scientific and native experience.

With regards to the assumption of science as an acculturating discourse, some other reflections are needed. Firstly, this conception could be controversial, especially for scientists, as it could bring some doubt to the truth value of scientific general laws. However, as it has already been highlighted, this notion opens the way for a study of science that may bypass, so to say, its "scientific" dimension, and that would emphasize its role as an expression of the culture from which it derives. That is, the validity of scientific laws is not challenged but the ways they are arrived at. In the second place, considering science as intimately related to the West and acting as an acculturating device may be questionable nowadays after all technological advances achieved by Asian countries. However, this statement could not be that dubious in the middle part of the 20th century and before, as Lim's work attest.

I now turn to illustrate how Catherine Lim has solved the question posed in this paper. As we have already seen, contact with science and Western culture has had an important influence in the work and life of the author to the extent that it has led her to the creation of a personal and individual cosmology. At the grounds of this personal cosmology would be science in its aseptic and impartial truth generating dimension. In Lim's words, "Over the years, my search for self-fulfillment shaped into a tripartite quest for Truth, Goodness and Joy. I wanted the truth of

knowledge, of the objective reality out there not the truth as dished out by tradition or conventional thinking" (*Unhurried Thoughts* 72). But being science avowedly amoral it could not satisfy her need for goodness so she then turned to religion, a personal religion of her own that could be summarized in the following way, "Don't do unto others what you don't want others to do unto you" (*Unhurried Thoughts* 72). Finally, there was a third aspect that she also needed in her personal cosmology and it was joy, the joy of the arts, literature, painting and dance. Joy implies freedom and spontaneity in the mind of the author and conveys this ironic and humorous edge that characterizes her works. By means of this personal cosmology, Catherine Lim has tried to find a personal space where to reconcile the various forces that constitute her hybrid identity. She seems to have reduced science to the sphere of attestable and measurable truth resorting to a personal cosmology as a means of assuaging, of finding a place for her multiple cultural influences.

As a way of conclusion, science constitutes an essential aspect in the life and work of Singaporean author Catherine Lim. It has provided the author with the truth needed to overcome traditional superstitions and beliefs that worked as constraints in her life. The importance of this aspect in the works of the author is attested by the many references to scientific laws and principles put to use as metaphors to explain life.

In the mind of the author, and also in the minds of many countries with a history of colonization, science has come to be associated with the West. Being science a vehicle for technological advancement and progress, these countries have embraced Western science while they simultaneously have intended to protect more inner aspects of their culture. This division has led to a schizophrenic split which, in Lim's works, can show up as guilty feelings or irrational fears. Notwithstanding, science and the search for verifiable truth, together with her love of the arts and sense of humor, has helped the author to overcome these same irrational fears. The cultural division brought about by the contact with different

aspects of a foreign culture seems to have been negotiated by the adoption of a tripartite cosmology where science and amoral truth would be on its base, followed by goodness or religion and joy or the arts.

Works Cited

Aikenhead, Glen S. and Masakata Ogawa. "Indigenous Knowledge and Science Revisited." *Cultural Studies of Science Education* vol. 2 (2007): 539-620.

Chatterjee, Partha. *The Nation and its Fragments.* New Jersey: PUP, 1993.

Foucault, Michel. *The Archaeology of Knowledge.* New York: Routledge, 1972.

Gilmour, Robin. *The Victorian Period: the Intellectual and Cultural Context of English Literature 1830-1890.* Harlow: Longman, 1993.

Kuhn, Thomas S. *The Structure of Scientific Revolutions*. Chicago: Chicago University Press, 1970.

Levine, George. *Darwin and the Novelists: Patterns of Science in Victorian Fiction.* Chicago: Chicago University Press, 1988.

---."One Culture: Science and Literature." *One Culture. Essays in Science and Literature.* Ed. by George S. Levine. London: UWP, 1987, 3-34.

Lim, Catherine. *Unhurried Thoughts at my Funeral.* Singapore: Horizon Books, 2005.

---. *Following the Wrong God Home*. London: Orion, 2001.

---. *The Teardrop Story Woman*. London: Orion Paperback, 1998.

---. *Meet me on the Queen Elizabeth 2!* Singapore: Heinemann Asia, 1993.

---. *The Woman's Book of Superlatives*. Singapore: Times Books International, 1993.

---. "Of Moles and Buttocks." *They Do Return*. Singapore: Times Books International, 1983, 42-46.

---. *The Serpent's Tooth*. Singapore: Times Books International, 1982.

---. "Or Else the Lightning God." *Or Else, the Lightning God and Other Stories*. Singapore: Heinemann, 1980, 178-194.

---. *Little Ironies. Stories of Singapore*. Singapore: Heinemann Asia, 1978.

Radhakrishnan, R. "Nationalism, Gender and the Narrative of Identity" *Nationalisms and Sexualities.* Ed. by Andrew Parker & Mary Russo. New York: Routledge, 1992, 77-96.

Said, Edward. *Orientalism*. London: Routledge and Kegan Paul, 1978.

Art and its Connection to Scientific Discovery Processes: The case study of Mihalis Papadakis' "The Girl with the Mirror"

Ensaio

Eirini Papadaki | Technological Educational Institute of Epirus (Epirus, Greece)

"The Girl with the Mirror"

Most art historians and almost all theories of art focus on perception of the artwork, that is, on the part of the receiver of the message. Not many scientific texts consider the actual creation of a work, the ideas and images the artist had in mind, the formulation of the concept—what would later be the content of the artwork—, the inspiration, the process of the creation, the milestones he/she had to overcome in order to give birth to the specific form. When someone sees or tries to study the side of the artist, it is usually with an eye on the historical and social instances that influenced his surroundings and shaped his personal experience. We will try to follow the actual process of making an artwork in an artist's lab, in order to firstly understand its essence, its necessity and its contribution to human knowledge. For this specific research the author chose to follow the sculptor Mihalis Papadakis, while creating the natural-sized sculpture "The Girl with the Mirror".

The choice of both artist and work was not a random one. Mihalis Papadakis[1] has extensively worked and written on the nexus between art and science, on the role of art on knowledge, etc. "The Girl with the Mirror", which I chose to present in this paper, is a sculpture which was inspired by and created during the procedure of an ongoing longtime research. It was conceived as a continuation of the artist's previous work.

Citação: Eirini Papadaki, "Art and its Connection to Scientific Discovery Processes: The case study of Mihalis Papadakis' 'The Girl with the Mirror'". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 125-146. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

"The Girl with the Ball" or "Movement-Development of the Point" is a series which started in 1987. According to the artist, "the theme of the series is a girl in puberty, namely the transition from childhood to maturity, and at the same time a point in space and time. I am treating it as the structural element (part) of a Whole. … A human being, being the most developed form of Nature that we know of, can also be Nature's Measure because it contains all its properties. … The process of entering adulthood under the pressure of the wider space-environment calls for a re-examination of the facts of experiential knowledge which contains the main elements of the final destiny. The ball and the hoop are playthings as well as perfect forms (in three or two dimensions - sphere, circle). "The Girl with the Ball" is the whole of existence" (Papadakis).

During his work with "The Girl with the Ball", Mihalis Papadakis started to realize that a mirror would probably help him to study reflection and therefore analyze the point as an extreme form of matter. "In front of the mirror the axes that are extended to both sides, composing the reflectional symmetry, provide it with the particular meaning of a 'functional' relation, which we meet often in nature... That functional relation is my subject of research but as catholic quality and cause of the Existence" (Papadakis).

Then there came a series of sculptures called "DESMOS". The artist continued to work on the structures of transition-movement in the point itself. The point is, for Mihalis Papadakis, "the non-existent that exists" and therefore the being, onto which geometry is based. After "The Girl with the Ball" (1987-1995) and "In Front of the Mirror" (1996-1997), "Desmos" studied "movement-energy as a property (Content) of matter. If, however, movement-energy could be seen as a property of matter, it had to participate in the formation of its geometric structure (Form-shape) and to be imprinted on it. The synthesis was based on the antithetical connection of two regular tetrahedrons embodied in the cube. … The work (series) searches for the geometry of the microcosm and macrocosm. The geometry of the

dynamic fields poses the question of Movement and Change, in other words, of Time" (Papadakis).

After "Desmos", the artist continued to work on the point and its relation to the universe, the human as a whole, the relation with and the reflection in the self. He started working on "The Girl with the Mirror". It was once again a continuation of a quest. After studying the point in space and time, its reflection and cause of existence, and after making his thoughts and research visible through subsequent artwork-images, the artist continued his research in different levels. Just like every scientist, the artist never stops working on the notions that he/she desires to perceive. In every work he/she makes a step towards solving the enigma, but also remains with the question: is that all there is to it? And he/she continues the research until the point when he/she thinks the subject is exhausted or the problem solved. Maybe this is the reason why it has been said that the artist actually creates only one artwork in his/her lifetime.

"The Girl with the Mirror" evaluates the world, as every other image in fact does. The work makes some statements to its gazer:

- The world as infinite refers to itself. Its movement is self-oriented.
- This, as Mihalis Papadakis wants to show, is an attribute of the universe.
- Consciousness is also an element of self-reference. And so is self-knowledge.

In the Introduction to his *Aesthetics*, Hegel argues that, before he/she creates, the artist ponders on his/her theme deeply and intensively. During the making, the subject-creator and the object-creation are in a perfect dialectical relation with each other. The process of creation is long and painful. How, however, does it all start? Does the artist have from the first instant the finished work in his head?

To actually create it, the artist works analytically (in detail) and synthetically (in order to connect all the details he/she has worked on as a whole). Dessoir (1970) argues that the artist carries the work as a pregnant woman carries her child, until he/she gives birth to it. As we have already seen, every artwork continues the

former and prepares the ground for the next one. All (or most of) an artist's artworks sum up a continuous whole. They all provide abstract, metonymic images of a research in development.

Aesthetic and scientific discovery and creation

Both art and science can be seen as problem-solving processes. They entail cycles of generation, evaluation and revision aiming at discovery and creation. Seeking after discovery and creation, artists and scientists alike follow careful steps in newly-explored pathways in mind and time. The previous section characteristically described how the artist works on specific concepts for many subsequent years—most of the created artworks functioning as continuations of the former and tests for the new ones. Holmes (71) shows how scientists leave more or less coherent trails on the pathway of their lifetime, pursuing specific research goals for years and years. In 1905, at the age of twenty-six, Einstein outlined the foundations for his theory of relativity, which he did not arrive at triumphantly until 1916. Even so, as Chandrasekhar has shown in his 1975 Ryerson Lecture entitled *Shakespeare, Newton, and Beethoven or Patterns of Creativity*, the artist evolves while maturing, while the scientist explodes his/her genius at a relatively young age and then slows down. On this account, Beethoven confessed his confidence on compositional knowledge only at the age of forty-seven, while the mathematician G. H. Hardy, in his essay "A Mathematician's Apology", writes: "no mathematicians should ever allow himself to forget that mathematics, more than any other art or science is a young man's game…". By 1926, Einstein "was letting the newer developments in the quantum theory, initiated by Heisenberg, pass him by" (Chandrasekhar, *Shakespeare*, 104). Papadakis' pathway seems still ongoing at the age of 70.

For every general rule, there are, of course, exceptions. Rayleigh, a classical mathematical physicist, is, according to Chandrasekhar, a striking example. His productivity was steady and uniform: 446 scientific papers (among other

publications) are gathered in six volumes, each one of them contributing to the science of physics, not one of which is trivial, and their results are characterized by J. J. Thompson in the 1921 memorial ceremony as "beautiful".

However different the patterns of creativity between artists and scientists, they all seek to find beauty in Platonian or/and Heisenbergian terms: the proper conformity of the parts to one another and to the whole. The discovery of Pythagoras,[2] Kepler's laws of planetary motion, Heisenberg's quantum theory are all widely seen in scientific bibliography as "beautiful".

Many scientists have based their scientific work on aesthetics. For Einstein, aesthetics was a scientific given. Both artists and scientists follow common strategies in the creative process—they both try to solve a problem. Both artists and scientists have a strong desire to solve the problem posed by their research. Arthur Miller compares the lives and work practices of Albert Einstein and Pablo Picasso in his book *Einstein-Picasso. Space, Time and the Beauty that causes Havoc* (2001). He argues that in the moment of creation, in both science and art, the cognitive fields fall apart; aesthetics dominates. Kant underlines the importance of knowledge that comes from the senses. For Schiller (2004), what differentiates knowledge that comes from the senses from knowledge that comes from noesis is form. For Chandrasekhar (*Truth and Beauty*) the role of imagination and intuition is as crucial as the role of knowledge and experience in any human discovery. For him, what the human mind perceives as beautiful finds its realization in external nature.

Science and art (as every kind of creative thought) have a common starting point: abstraction. Art makes truth real, making visible that which is invisible but nevertheless exists. It all works through abstraction—the essential tool for all research. Art can benefit from scientific breakthroughs, but aesthetic abstraction is a must for all science. The ability to deduct one theme into a framework of basic dynamic characteristics should be common to both artists and scientists.

The Creation of an Artwork

The conception of the idea for the creation of an artwork may arise on many occasions, often phenomenologically random. In every case, however, it is directly connected to the way each artist understands and seeks for meaning in the aesthetics of the images of abstraction. That is generally a law of aesthetic thought, as it consists of the anagogic classification of the numerous images of sensuous perception. This happens regardless of the subject's—artist or viewer—knowing of the existence of the specific law. Therefore, either from the beginning, or some time afterwards, every work of art appears as another one of humanity's momentous steps towards knowledge.

The artwork in our study—"The Girl with the Mirror"—is an approach to self-reference—the reference to the self as a position and as a denial. The artist considers self-reference as a basic element of movement in general. In the specific artwork, self-reference is expressed through the mirroring of the image of the self in thought as the eternal return to it (the image) and the always necessary phase towards the development of the realization of the self as a whole (process of self-consciousness, part of the process of knowledge).

Figures 1 and 2 show some of the artist's sketches and notes before the creation of the work. The artist already has in mind the general schema of the abstract notion, the turn to the self, as a precondition for the extension of the thing. He seeks for the basic relations that establish every existence (according to Mihalis Papadakis, the point is the product of two intersecting lines), which, in mutual relation with other existences, create the elements of centrifugal dynamics.

Figures 3 and 4 show the first sketches with the model. At this point the abstract notion (general schema) is tested in its interaction with partial schemata, which are deducted from the images that a known object-model gives out. During this phase, the general schema is verified and enriched; it acquires individual

hypostasis. That verifies the way through which the universal exists in the individual.

Figures 5, 6 and 7 show the skeleton (construction with iron and wood), on which the work is built. The skeleton has the scheme of the abstract notion, but now in three dimensions, which influences in different ways the general formalization of the artwork.

Figures 8, 9 and 10 show the adding of mass (plasticine) on the existing skeleton. This procedure is made in such a way that in every phase of a scale it keeps pace with the seeking of the basic elements of the character of the form which, in its generality, will be maintained and will be the connecting element of the work's plasticity, whichever its role in the development of smaller scales.

Figure 11: when the model made from plasticine has reached such a point that the problems of the form in its basic scales have been solved, the artwork is turned to plaster through a forming block (made from plaster), which is destroyed afterwards.

Figure 12: the work on the plaster sculpture has more to do with the relation of the big scales with the smaller ones and with the problems of the plasticity of the form's rhythms—and this is the phase in which the sculpture is finalized. The next step is for the sculpture to be sent to the art foundry.

Figures 13, 14 and 15 show three views of the final artwork in bronze.

The whole process goes from the abstract to the specific—and the specific is a combination of abstractions. The representation of the general idea could stop, be considered final, in many phases of the procedure. For example:

1) as a general relation between systems of lines (figures 1, 2 and 4),

2) as a construction of the structure of these systems in three dimensions (figure 6),

3) as a structure-base, onto which unsymmetrical and random micro-masses (figure 7) sit,

4) as plastic forms and schemata, which add some references to other ideas to the general idea (figures 8 9),

5) as the identity of the plasticity which offers a particular form of the material world (model) and which, when combined with the plasticities and schemata of 4, give to the individual the notion of the general idea as a cause (figure 10 in plasticine, figure 12 in plaster, figures 13, 14 and 15 in bronze).

In phase 5 the cycle is, according to Mihalis Papadakis, completed. The general idea is drawn from the observation of innumerous particular forms of our world. When someone manages to give that general idea its representation and its function as a cause for the representation of the individual, then it completes the cycle of aesthetic abstraction, while drawing, at the same time, a new one.

This seems to be in general the way in which aesthetic abstraction is developed. Art, as a unique function, simply makes this way its own and cultivates it. This unique function, however simple it may seem, when drawn apart from the others due to social allocation, gave human culture an indispensable boost for its exponential development.

Sketchbooks, models and methods

"The scientist's *intellectual intuition* operates with *productive imagination* on scientific background knowledge to solve its difficulties in explaining reality. This is done by *productive imagination* operating by instinctive and practical self-control to recombine the iconic and indexical imagery meaning-contents of background knowledge to discover a new imagery picture of reality" (Nesher 235). The scientist forms, after that, an abstract hypothesis, which he tests, re-phrases, re-tests, molds and shapes until he reaches a satisfying outcome. In mathematics, experiments are attempts to try and test, prove or improve a theory. "Proofs in informal contentual mathematics do not justify us to accept a result unconditionally, but they justify us to accept it provisionally till it is improved by a newthought-experiment" (Glas 59).

This means that the mathematician might not stop, as Papadakis could, at some stage of the artwork, but he/she might pause, for others or himself/herself at a later stage to continue.

Both for the artist and the scientist systematization and method are crucial. In their route towards discovery, they need to find problem-solving strategies and constraints. They both have at their disposal many resources provided by the artistic and scientific community respectively: from concepts and accepted theories to empirical knowledge, tested methods and formulas, aesthetic and intellectual intuition, imagination and a history of past endeavors. Sketches aid both artists and scientists in the discovery process, as they vividly portray the known and point the gaps, inconsistencies or problems that need more work and/or revision. "The value of an imagery representation is that it makes some structural relations immediately evident" (Magnani 103). Both artists and scientists use visual abductions (along with many other abductions involving sketches, diagrams etc) in what Magnani calls *model-based research*. This kind of strategy—as well as mental-modeling[3]—is central in innovation for many scientists.

Science and art

Nesher, following Kant, sees a dichotomy between science and art—an epistemological division between theoretical (logical) judgment and aesthetic (reflective) judgment, when the former is an objective and true representation of reality while the latter is subjective though universal to human nature in aesthetic experience without representing reality (Nesher 235). For Nesher, "artism" presupposes artistic free productive imagination in creating fine arts, while "scientism" is guided by "determinated mechanical rules of formulating theories" (Nesher 234). Art is about fantasy and the senses, while science works with intellect—any random or unverified outcome is out of the question. Science is about the necessary. For an artist, the role of intuition and fantasy is important, but

not easily or necessarily explainable. The senses, the experiences, the personal elements that determined the artist's past and present and formed his/her personality are interrelated in the work, together with a more or less deep perception of the history of Aesthetics (from the individual to the collective). The mystique of the work of art lies on the fact that, despite referring to the collective meaning of Aesthetics, at the same time it holds tight the individual element. Science denies intuition in the final result—it all has to be tested and proven with the use of specific and unmistakable technology, depending on the field of research. However, no great scientist has ever denied the role of memory and intuition during the process of solving a set problem. According to Miller (*Insights of Genius*), creativity needs guidance: from aesthetics, from visual instances in fantasy, from tradition in the field of work, from stored visual ideas, from intuition. Information and knowledge are drawn from memory—logic symbols and visual signs are brought together in fantasy. Unconscious thought brings notions from phenomenologically unconnected cognitive fields to mind as bridging truths. As Ribot has pointed out, the logic of the images is actually the flourishing power of productive fantasy.

For many important theorists, art is a form of knowledge. For Hegel, it is a knowledge given in images. For Fischer, it is a work and only as such does it entail knowledge—much research is needed from the artist for a work of art to be made. The work of art includes, according to Fischer, a paradigm of the relation between the human and the world. It uncovers the real being of things, according to Heidegger. Art tries to affiliate its viewers to wholeness by unveiling to them the catholic truth—hence the ecstasy in front of an artwork.

Art is therefore necessary in order for man to be able to deeply understand and change the world. In order to understand the world, we need to study it first. That means scientists could use art to make science. For Arnheim (*Visual Thinking*), art is the most powerful medium for enstrengthening the perceptual factor, without

which no meaningful thought can be produced in any field. The possibilities provided by images are necessary for the mind to function.

Afterthoughts

We think through images. Images are the tool for abstract thought. A child needs to find images for the notions he/she wants to understand. Abstraction is a fundamental ability of the human brain. The human being is from birth exercised to think through images. The classification of an unending world through images is an element of survival—this is how both humans and animals survive: through these anagoges they can understand good and bad, utility and danger etc.

According to Arnheim (1969), thought tries to find the basic structure of the things it studies—their necessary qualities. As seen while observing Mihalis Papadakis create his work "The Girl with the Mirror", so does art. In addition, with the power of his/her illuminative fantasy, the artist makes these qualities visible. From a basic idea-image, the artist tries to find the generalities that apply to universal truths. He then gives the general a specific (the model's) form, specific properties. The final work has a specific form, but is also the visualization of the basic structure of the universal, that which entails several partialities.

The scientist also needs to make abstractions—he/she does not choose his/her samples in any random way. The sample needs to have the qualities of the universal he/she desires to study. The scientist, too, seeks for universal truths, the structural abilities of that which is studied. A finished work of art could offer to the scientist visual structures for the characters of things, relations, or anything that could be placed on canvas and under the microscope.

A work of art is a product of thought, but it also proposes a way of thinking. It entails and provokes visual thinking. As explained above, during the process of making an artwork, the artist comes across problems of choices and organizations—what is proposed is valued equally to the way the proposal is formed. Most

importantly, the making of the artwork entails cognitive processes, interplay between vision and thought.

Science is forced to adopt the notion of beauty, beyond the countable. Wassily Kandinsky has offered many clues for the psychology of vision. Albert Einstein believed that when an equation was "too beautiful" it could not but be real. Henri Poincaré has said that we prove through logic, but we discover through intuition. As every other human being, the scientist, too, thinks and works with the help of images.

Art evaluates the world as one image. The "Girl with Mirror" explicitly says that the world as infinite refers to itself. Its motion is set by itself—it is self-moving. And that, the artist proposes, is an ability of the universe. This is the proposal of the specific artwork to its gazers; and possibly a problem posed to science.

We should stop, therefore, seeing art and science as two parallel activities, comparing their practices, phases and/or research results. We should perhaps see art as an irreplaceable help for science, providing it with tools (abstract images) for fruitful thinking. Art images may provide new information. Art is a visual form. If visual forms are the main media of productive thought, then artists, as experts on organizing visual information, could help people practice perceptive thought. If humans think through images, then art could, by creating new images, guide thought (and science) to new undiscovered passages, proving a helpful—if not necessary—step towards knowledge. That means that not only the "making", but also the "sensing of" and the "writing on" art gain—or should gain—a whole new perspective.

Figures

Figure 1:

Figure 2:

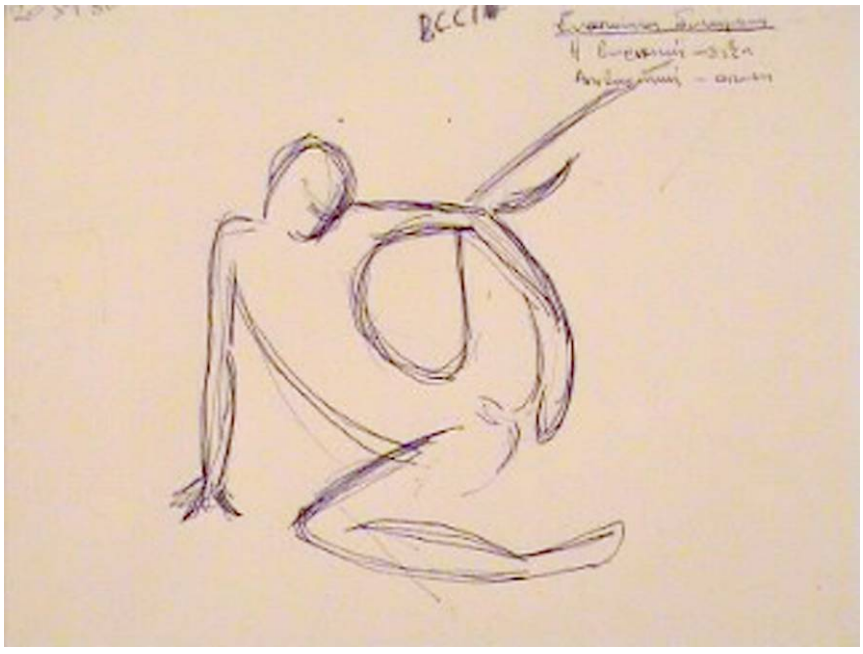


Figure 3:

Figure 4:

Figure 5:

Figure 6:

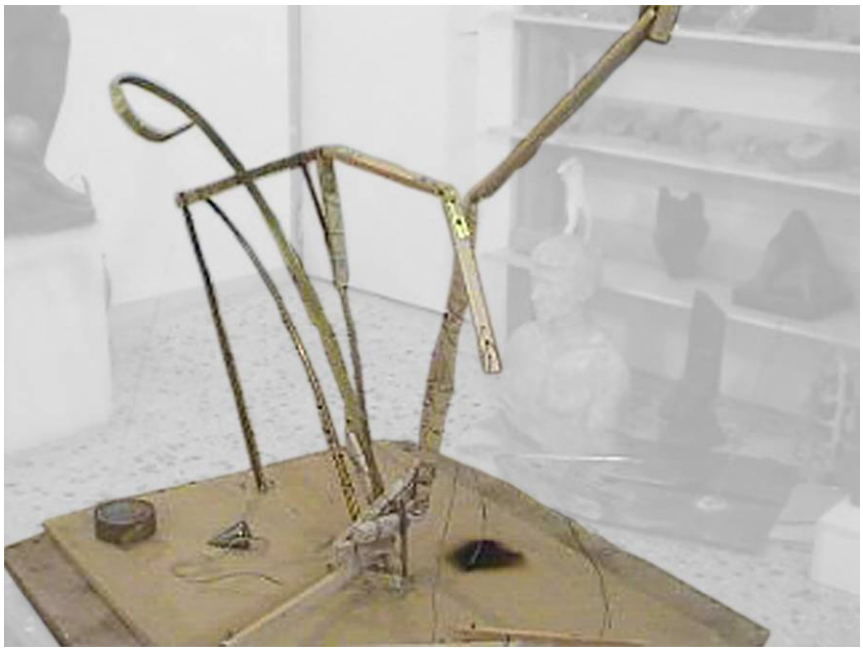


Figure 7:

Figure 8:

Figure 9:

Figure 10:

Figure 11:

Figure 12:

Figure 13:

Figure 14:

Figure 15:

[1] I met Mihalis Papadakis in 2000 (we are not related, despite the identical surnames!). He was serving as a president of the Chamber of Fine Arts of Greece and at the same time he was organizing exhibitions and theoretical discussions at his artistic lab, together with other artists and art historians. For the last ten years he is also a member of the Advisory Board of the National Museum of Contemporary Arts. For more information about the artist's biography and work see his web site www.mpapadakis.com.

[2] Vibrating strings, under equal tension, sound together harmoniously, if their lengths are in simple numerical ratios (Chandrasekhar, "Shakespeare", 105).

[3] "In the first place, a mental model is a form of knowledge organization. There are two main usages of the term 'mental model' that tend to get conflated in the literature: (1) a structure stored in long-term memory (LTM) and (2) a temporary structure created in working memory (WM) during a reasoning process" (Nersessian 154).

Works Cited

Arnheim, Rudolf. *Art and Visual Perception.* Berkeley and Los Angeles: U of California P, 1964.

---. *Visual Thinking*. California: U of California P, 1969.

Chandrasekhar, Subrahmanyan. *Shakespeare, Newton and Beethoven or Patterns of Creativity*. The Nora and Edward Ryerson Lecture. Chicago: The U of Chicago, 1975.

---. *Truth and Beauty: Aesthetics and Motivations in Science*. Chicago: U of Chicago P, 1987.

Dessoir, Max. *Aesthetics and Theory of Art*. Detroit: Wayne State UP, 1970.

Fischer, Ernst. *The Necessity of Art: A Marxist Approach.* London: Penguin Books, 1963.

Glas, Eduard. "On the Role of Thought-Experiments in Mathematical Discovery." Ed. Joke Meheus and Thomas Nickles. *Models of Discovery and Creativity*. Dordrecht, Heidelberg, London, New York: Springer, 2009. 57-64

Heidegger, Martin. *Holzwege*. Frankfurt am Main: Klostermann, 1950.

Holmes, L., Frederick. "Experimental Systems, Investigative Pathways, and the Nature of Discovery." Ed. Joke Meheus and Thomas Nickles. *Models of Discovery and Creativity*. Dordrecht, Heidelberg, London, New York: Springer, 2009. 65-80.

Magnani, L., "Creative Abduction and Hypothesis Withdrawal." Ed. Joke Meheus and Thomas Nickles. *Models of Discovery and Creativity*. Dordrecht, Heidelberg, London, New York: Springer, 2009. 95-126.

Miller, Arthur. *Einstein – Picasso. Space, Time and the Beauty that causes Havoc.* New York: The Perseus Book Group, 2001.

Miller, Arthur. *Insights of Genius: Imagery and Creativity in Science and Art*. New York: MIT Press, 2000.

Nersessian, J., Nancy. "Conceptual Change: Creativity, Cognition, and Culture." Ed. Joke Meheus and Thomas Nickles. *Models of Discovery and Creativity*. Dordrecht, Heidelberg, London, New York: Springer, 2009. 127-166.

Nesher, Dan. "The Role of Productive Imagination in Creating Artworks and Discovering Scientific Hypotheses." Ed. Heinrich Richard et al., *Image and Imaging in Philosophy, Science and the Arts: Proceedings of the 33rd International Ludwig Wittgenstein-Symposium in Kirchberg*. Kirchberg: Ontos, 2010. 234-238.

Poincaré, Henri. *Science and Method*. New York: Dover, 1952.

Ribot, Théodule. *The Evolution of General Ideas*. New York: Open Court, 1899.

Schiller, Friedrich. *On the Aesthetic Education of Man*. New York: Dover Books of Western Philosophy, 2004.

www.mpapadakis.com, 23 June 2014.

Who Wrote the Article?

Ensaio

Giuli Liebman Parrinello | Università "Roma Tre" (Rome, Italy)

Introduction

The title of this paper is intentionally ambiguous, reflecting the crucial connections that exist between higher-order mental processes and brain activity, that is, the correlation between mental states and their neuronal basis. These are of such importance as to raise questions about the consciousness of the author in producing a text or, in this case, an article.

Indeed, it is no exaggeration to see neuroscience as a kind of fifth scientific revolution, as argued by the leading neuroscientist Ramachandran,[1] especially since the fundamental discovery of mirror neurons by an Italian research group at the University of Parma in the 90's (see Rizzolatti and Sinigaglia). Neuroscience is not only spreading to an increasing number of fields of knowledge, but it is also celebrated somewhat triumphantly at a popular level, thanks to the well-documented proof provided by *neuroimaging* or *brain imaging*. In fact, the seductive colorful maps which emerge can be extremely persuasive. Nevertheless, non-invasive functional neuro magnetic resonance (fNMR) experiments only show the functions of certain areas of the brain, and many objections have been raised.[2]

These recent developments in neuroscience have lead directly and/or indirectly to a substantial modification regarding the traditional sectors of culture. In viewing this new framework, we can identify forms of new interdisciplinarity, bridging the gap between the so-called "two cultures", and perhaps definitively ending the rift between them by envisioning a "third" or a "fourth culture" .[3]

Indeed, the relationship between neuroscience and the humanities in general is a fascinating issue. Naturally, a dialogue between philosophy and neuropsychology might be seen as one of the more consolidated sectors involved, although radical disagreements and clashes of opinion often characterize the mind-

Citação: Giuli Liebman Parrinello, "Who Wrote the Article?". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 147-162. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

body debate.[4] Nevertheless, new disciplines are evolving, particularly neuroaesthetics, neuro-ethics and, neuroeconomics. Additionally, other sectors, especially law and the social sciences, are implementing the advantages of the new scientific revolution, even leading some to speak of "neuromania" (see Legrenzi and Umiltà).

In this paper we argue that the complex procedure of writing an article is a privileged subject of reflection, casting light upon a variety of issues. We intend to examine the process involved in producing a short essay, which, hypothetically, could be a piece of literary criticism. In the present case, even if we are referring to the humanities, the term "scientific article" is used, given that it is an academic contribution to a journal, part of a collection of essays or a conference paper, perhaps proposing a relatively new point of view supported by rigorous documentation, but where a high level of creativity and innovation are not necessarily at stake.

In this way we are positioning ourselves at a complex crossroads in many respects: first of all, we assume that it is an embodied process because of the neurons and neural architectures of the brain determining the writing of the article, and, in particular, because of the (often neglected, but fundamental) haptic implications of the writing process. Despite the involvement of many different cognitive mental activities, such as perception (attention), memory and imagination, it is apparently only a semi-creative process in the sense that it is an ordinary everyday exercise for academics, often part of the usual routine of tasks to accomplish. In addition, writing must be considered an important linguistic activity.[5] This raises several questions, e.g. whether the left, right, or, in all probability, both hemispheres are involved, and even how language is conceptualized, not from an abstract, but from a neuroscientific embodied point of view. This issue is thus situated at the meeting of several old and new disciplines in the humanities, from literature and literary criticism to neuroethics, neuroaesthetics, and so on.

Last but not least, the methodological aspect itself is extremely controversial, as in principle, neuroscience requires scientific observation in the third person, while examining the writing of an academic article favors a more humanistic "soft" method.[6] In our case, we propose to follow the process of writing an article by trying to reconcile a first-person analysis of mental states with the fundamentals of neuroscience, discussed with the layman in mind, and supported by some fundamental references.

The traditional, dramatic problem of the relationship between introspection in the first person singular, on the one hand, and the third-person objectivity required by rigorous scientific investigation, on the other, is linked to the rift between hard sciences and the humanities and also characterizes the various theorizations of psychology itself. And yet, perhaps that divide is not so great, especially when considered in the light of proposals for a solution, authoritatively put forward by the neuroscientist Antonio Damasio. As Damasio states, "The idea that subjective experiences are not scientifically accessible is nonsense" (309), and he adds, therefore, that the knowledge gathered from subjective observations can inspire objective experiments while subjective experiences can be explained on the basis of scientific knowledge (309).[7]

After these brief preliminary remarks, we now intend to follow the process of writing an article, discussing the various stages, and the different alternating states of mind involved, from its genesis to its completion. This will also reveal some unexpected features. The conclusion will return to the initial problem raised in the title, and examine the responsibility and consciousness of the author. A new horizon thus emerges which leads us from the embodied process of writing an article to a view of a potential "extended mind" which ultimately goes beyond the text of the article itself.

Genesis and Neural Architectures

The beginning of an article is apparently indefinite and imprecise, even if it is usually triggered by external stimuli, such as a discussion with a colleague or an official call for papers. In some cases, however, it may arise spontaneously as part of a chain of circumstances and/or to an inner, and, to a greater or lesser extent, non-rational need on the part of the scholar at that particular moment.

It is useful at this point to recall the incredible number of neurons in the brain (around 100 billion) as well as the brain's great synaptic plasticity: there are approximately 10 trillion synaptic connections and their complex architecture involves a plurality of levels, such as neurons, local circuits and subcortical nuclei, connecting systems and systems of systems. The central nervous system, whose main component is the *cerebrum*, is linked to every point of the body by bundles of axons which originate in the cell body of neurons (Damasio 331, 325).[8] The English terms *to fire* and *firing* (like the German *feuern*) with their loaded metaphorical associations – much more expressive when compared to the less connoted Italian term "attivarsi", to become active – convey this rapid, diffuse activation of neurons. Moreover, according to the basic Hebbian theory already formulated in 1949, neurons that fire together wire together; that is, due to synaptic plasticity, the more often that A and B fire together, the stronger the synapsis is in forming links in the circuit.[9]

In a sense, the origin of the writing process can be compared to the situation when a functional magnetic resonance experiment begins, i.e. with the contested problems regarding the activity and activation of the so-called *resting brain* (Boella 23). Even if the subject is in a state of relaxation, the stimulus is probably coupled with pre-existing, particularly strong, neural architecture, so that a simple stimulus, such as a call for papers, can have unpredictable consequences, going far beyond its restricted target and spreading like a flame to the various areas of the brain involved.

In a broader conceptualization of neuroscience, factors such as environment and education, but also age, memory and attention level all combine to determine the architecture. In particular, even if a detailed discussion is beyond the scope of the present paper, it should be underlined how memory, in its flexibility and its various typologies, is involved in our neural and mental experience. To again quote Damasio, "All of our memory, inherited from evolution and available at birth, or acquired through learning thereafter, in short, all our memory of things, of properties of things, of persons and places, of events and relationships, of skills, of biological regulations, you name it, exists in dispositional form (a synonym for *implicit*, *covert, nonconscious*), waiting to become an explicit image or action. Note that dispositions are not words. They are abstract records of potentialities" (Damasio 332).

In fact, when writing an essay we are often aware of our explicit short-term working memory and we exploit its mechanisms; on the contrary, we are not aware of the hidden world of implicit memory and can be influenced by a past experience without being conscious of remembering it (Schacter 169). One curiosity regards the humanities in particular: even the deep structures of lines of poetry learnt by heart in the past become associated with rhythm and can play an important role in the writing process. Stimulus can also be ignited by taste (even if smells and perfumes are probably more likely to do this). The case of Proust's madeleines is paradigmatic, as their enjoyment triggered the whole cycle of novels comprising *À la recherche du temps perdu*: in the overture of *Du côté de chez Swann* the accent is on "involuntary" memory, taken as an autobiographical memory based on an association with everyday life.[10]

Without delving into the specialist field of literary studies, the importance of metaphor should be highlighted. It is associated with higher-order human consciousness and therefore coupled with language, but at the same time works on a non-linguistic, unconscious level, no doubt mediating between the two cultures.[11]

Specific Embodiment

In recent decades, there has been much talk about a so-called "second orality" (Ong 136), but, in spite of general expectations, a new, omnipresent era of writing is also appearing on the horizon (see Dehaene; and Ferraris). This is a moment of continual technological innovation and probably also of transition: already an increasing number of children first learn writing by using a QWERTY keyboard on a screen, and only subsequently take up a pen. Indeed, in spite of touch screens and voice controls, we can see that there is still some attachment to the layout of the traditional QWERTY keyboard even in this digital age. Moreover, as regards embodiment, new performances are continually being adopted, especially gestures linked to the new way of touching screens, such as tablets and smart phones, rather than traditional computers. These practices determine novel and interesting associations and, from an evolutionary viewpoint, are probably an unpredictable factor in development for both brain and mind. Writing is a complex cognitive procedure and material support is a fundamental choice, loaded with consequences. The opening words of an article can be scribbled on a piece of paper, written in more or less legible handwriting, typed on a computer or casually noted down on a tablet. The implications are quite different in each of these cases: "the switch from pen and paper to mouse, keyboard and screen entails major differences in the haptics of writing, at several distinct but intersecting levels" (Mangen and Velay).

Writing is also technology: in our opinion the old question of technologies discussed by the German philosophical anthropologist Arnold Gehlen in his interpretation of culture as human prostheses (9-34) is reflected today in the controversial term the "extended mind" (Clark and Chalmers 10-23; Menary 1-25). In a nutshell, the issue raised by this theory is "Where does our mind stop and the rest of the world begin?" On the one hand, after the long supremacy of rationalist

and positivistic beliefs stressing cold cognitive processes, embodiment nowadays is taken for granted, along with pertaining feelings and emotions. On the other hand, decisive external manipulations also intervene. Menary refers to our very case, writing an essay, noting that this process would be impossible if limited to our minds alone, while "Stable and enduring external written sentences allow for manipulations, transformations, re-orderings, comparisons, and deletion of text that are not available to neural processes" (240). Certainly, it can be objected that the writing system, less evident with handwriting, is now also an overt coercive conditioning, a pattern, a grid. It is not only the determining influence of the writing system; there is now, through the new media, something closely related to globalized patterns, for example the dominant Word system or the prevailing Times New Roman font. It reminds us of Dehaene's provocative thesis, according to which our brain is not constructed for reading, but adapts the existing neuronal systems of primates, which are far from being a *tabula rasa*, to our own visual limitations (7).

If, as is known, the reading and comprehension of the written word stimulates the left occipital-temporal area of the brain, less is known about the actual production of writing.

Stages in the Writing Process

Often motivated by an initial stimulus as well as by past reading, the scholar perhaps reacts with a slight shudder and a thrill of anticipation when faced with the task that is about to be undertaken. And yet they are on their guard, aware and apparently conscious, usually at the beginning, although in some cases not immediately, that a rational stage is developing, when they feel that they are in control of the subject matter and try to structure it, often drawing up a "rationale", a list of points and/or dividing the work into sections.

Each new stage in the writing process is accompanied by alternating positive and negative attitudes and feelings, and embodiment, even if it is not perceived as

such, is a fundamental issue throughout. Moments of satisfaction and well-being can be associated with the sensation of being practically ready to continue writing the article, although these may be replaced by moments of despair. It is telling that those moments of self-reassurance are often coupled with a sigh of relief.

The writing process is also sometimes a process of suffering, of confusion and a feeling that work is not progressing. This is particularly true if we find ourselves thinking about the relatively high rate of productivity of our American colleagues who since college, as they tell us, have been accustomed to writing a paper with one hand and carrying out various other tasks with the other. Such a comparison might drive us to the deepest despair.

The intermediate stages in the writing process are often mainly unconscious. The unexpected sound of a pop song sung softly to ourselves is a sign that we are relieved, although we do not know why we decided to sing and the choice of our cheerful tune remains a mystery. No experiment is ever going to reveal such mechanisms.

It is well known that sleep has a fundamental function regarding memory in that it consolidates, stabilizes and re-consolidates. Even during the night, from evening through to morning, various changes can occur. In fact, a large number of neural connections is made in the brain during sleep, determining new judgments and considerations related to the writing of the article.

Waking up can be accompanied by the sensation of having a steady brain and clear mind, as if they were bright and new. This can happen once or several times during the writing of the article. Even after pausing for several days or a week, the author on returning to the article has the vague impression that old and new neural architectures have been activated.

Moreover, a scientific work such as an article is often left to lie dormant for some days or weeks, either by desire or due to circumstances beyond the author's control. Even during this abandoning of the manuscript, however, an idea which

pertains to it can rise to the surface with immediacy, for example while one is swimming in the sea or in a pool. The state of being rocked by the particular amniotic materiality of water might well produce a worthwhile and far-reaching solution to problems.

We know that many brain processes are involved in various ways in the small enterprise of writing an article. Occasionally, however, particularly with more creative, more immediate activities, the author may be faced with a dangerous sense of void. A short poem by the Austrian poet Ernst Jandl comes to mind, which encapsulates our understanding and is emblematic of the whole process. Here, the poetic "I" initially feels he is in a position between "nothing" and "something" and sits down at his typewriter with a blank sheet of paper in front of him and apparently "nichts im kopf" [nothing in his head]; nevertheless, he manages to stand up later and read "als text/ etwas aus meinem kopf" [as text something out of my head] (175). This stimulating poem is food for thought, all the more so as nowadays our computer, which has completely substituted the typewriter, implies a complicated, interior mental process with regard to computationalist cognitivism and second AI. We are beyond the confutation of computationalism formulated by Searle in the 80's with his Chinese room argument; the apparent "nothing" of the brain coupled with the machine has given birth to a new product, in this case a poetic one, a complete written text.

Neuroenhancement

"Any of several techniques or systems intended to enhance the ability to think either by use of prosthetics or by use of electrical or chemical stimulation" (*Wiktionary*). Accepting this broad definition, neuroenhancement is an increasingly common concept and even traditional stimulants can be considered from this viewpoint. The environmental and physical context is also a determining factor for the scholar and is largely under her/his control: the time of day may be more or

may be less conducive to writing, not to mention the lighting conditions. Furthermore there is also a close interrelation with our own well-being, for example, with our digestive processes, which determine how much attention we pay to the exercise. The limbic system is particularly sensitive: the unexpected stimulation provided by a pen or a finger unconsciously caressing the writer's upper lip or nose can also have an impact on production. As is well known, perfumes and odors can act as important stimulants – and they do not need to be particularly refined. The case of the German poet Schiller is well known: he needed to have a supply of rotten apples placed all around him and in the drawers of his desk in order to compose his works. In many cases, an acceleration in the writing process can simply be induced by a cup of tea or coffee, a glass of wine or a cigarette, which can facilitate and encourage. It is common knowledge that the stimulation provided by nicotine is particularly effective. The Nobel prize winner Daniel Bovet highly appreciated its effects, despite the unfortunate fact that its negative and dangerous side effects remain.

In addition, more and more neuropharmacological products have been used in recent years by college students and young professionals, whose use and abuse raises serious ethical questions (Boella 5-6). This is not to mention the use of actual drugs, controlled and monitored to a greater or to a lesser extent by their users.

Neuroethics

The development of neuroscientific research involving the relationship between brain and mind touches upon some of the most profound aspects of human existence. In the first instance it has led to problems linked to the ethics of this particular field, that is, to bioethics. In the last decade, advances in manipulating the brain and brain imaging have raised an increasing number of ethical challenges, particularly regarding the moral limits of the use of such technology, resulting in the new discipline of neuroethics. Here the culture of bioethics blends with both old

and new philosophical questions concerning, for example, consciousness, personal identity, freedom and free will (Boella XVII-XVIII).

The case of Schiller also leads in a certain sense to the question of neuroethics. This writer is of course one of the 'greats' of world literature, but calling him to mind is also useful if we consider the more modest exercise of writing of a scientific article. In the short story *Schwere Stunde*, Thomas Mann describes Schiller, ill and struggling with the creative process in the dead of night, with due emphasis on the ethics of writing. Mann writes, "Und es wurde fertig, das Leidenswerk. Es wurde vielleicht nicht gut, aber es wurde fertig. Und als es fertig war, siehe, da war es auch gut" [The work of suffering became finished. It was possibly not good, but it was finished. And when it was finished, look, it was also good] (190-6). In the end "fertig" (finished) correlates with "gut" (good). In fact, the '"Protestant ethic" of a job well done is only a surface reading of the process; for contemporary scholars it is also probably linked to more specific 'academic' ethics which have accompanied them since their college years. We thus need to go beyond Mann's consequential ethical formulation. In terms of pervasive neural architectures, this is not a linear process as such, but a continuous semi-conscious and unconscious development of "morale prima della morale" ("the moral before the moral", as in Boella's subtitle). Indeed, what kinds of reassuring neural architectures are activated by the knowledge of having accomplished a task and done one's duty? Of course, many issues are raised and these need to be formulated.

Conclusion

To sum up, we have seen that the writing of a simple article is an extremely complicated issue. Moreover, there is no substantial difference between the neural processes of a mediocre scholar and those of a genius, even if writing for the latter is possibly less tiring, less time-consuming and more creative: the neural basis,

involving many different areas of the brain, is irremissible for all, without exception. Even if our author is not aware of it, the conclusion of her/his article is explicitly embodied, even though at most s/he will be aware of that sigh of relief and the sensation of being free of a burden, and perhaps ready for a new task. It is as if all questions are reconciled: in this moment of harmony the neurons in the brain and the actual result of the writing system (usually black upon white) correlate, at least at the level of the finished product, the text.

At this point we return to the initial question regarding the responsibility of the author of the article, and to issues strictly related to the problem of identity and closely connected to important moral concerns. The simple question "Who wrote the article" (including *this* article) has revealed a multilayered process, and forces within us which are neither those of a massive ego nor completely obscure and zombie-like. In the light of a partial reorganization of consciousness, the full significance of the final product is still to be explored; we need to go beyond the consciousness that the inadequate framework of phenomenal experience provides.

Therefore we now arrive at the definitive conclusion of our paper, moving towards a second stage, which is difficult to describe in a few lines and risks becoming a few hasty final conjectures. On the one hand, social and cultural aspects cannot be neglected. On the other hand, a possible solution could be found in a formulation based on extended mind theory in its milder version. According to arguments which have been defined as second-wave cognitive integration, physical manipulations of external vehicles are explained in the sense that they are different, but also complementary, to internal processes, as Menary (227-243) and Sutton (189-225) suggest. In terms of text, the metaphor of a collective cyberworld evoked by the cloud (which has already become a technical term) can also be cited. A line by Emily Dickinson, "The brain is wider than the sky" – NB the brain, not the mind – is particularly apposite. In fact, today it seems that the sky has already been

conquered and is scattered with clouds. This, however, leads to a new line of argument which goes well beyond the modest limits of the present article.

[1] As a fundamental handbook of neuroscience, *Principles of Neural Science* (Kandel et al.) remains valid.

[2] The dangers of a flat physicalist reading have been discussed, for example, by Alberto Oliverio in *Prima lezione di neuroscienze* and the limited localization and artificiality of experiments when compared with the complexity of the human mind have been studied by Laura Boella, in *Neuroetica. La morale prima della morale*.

[3] In general terms, Snow's *The Two Cultures* is still a useful reference. For an updated position regarding a "third" or a "fourth culture" with art even anticipating scientific discovery, see e.g. Jonah Lehrer's *Proust was a Neuroscientist*. The problem has been raised extensively in terms of neuroaesthetics and the aesthetics of reception. In particular a debate has begun regarding the transfer of knowledge in literature. See Lauer 137-165; Koepsell and Spoerhase 363-374; and Salgaro 137-167.

[4] For a balanced view of approaches such as radical reductionism and eliminativism, see Searle 19-20.

[5] We are not specifically taking a linguistic approach, but would like to recall that important changes in the field of embodied linguistics have taken place; see Gallese and Lakoff 455-479.

[6] It is assumed that *brain imaging* cannot record a long, evolving complex process lasting at least several weeks; the findings would be limited, even if such experiments might well cast some light on individual aspects of the mental process. Some experiments could be set up incorporating fMRI, perhaps in combination with other non-invasive techniques.

[7] Two German neuroscientists have recently proposed "First-Person-Neuroscience", an "investigation of neuronal states under guidance of and on orientation to mental states" (Northoff and Heinzel).

[8] See also Gerald Edelman's *Wider than the Sky: The Phenomenal Gift of Consciousness*.

[9] As Lakoff puts it, "We are born with neural circuitry that effectively activates a "map" of one part of the brain in another part of the brain".

[10] Apart from this and other cases concerning novels, poetic structures have recently been explored in relation to neuroscience: in a book co-authored by a poet and by a neuroscientist, it is even claimed that poetry is the only literary genre in a position to represent the dense complexity of how the brain elaborates the world around us (Schrott and Jacobs 8). More focused on aspects of reception is the *Wirkungsaesthetics* of the German poet Durs Grünbein who links poetry and neural maps through the introduction of the so-called N 400 factor, distinguishing the unforeseen nature of poetic expression from ordinary language (Salgaro 49-62).

[11] Lakoff considers his prior theorization of metaphor (see Lakoff and Johnson) still valid, although he more recently states that neural theory represents an advance in understanding how thought and language work and "how metaphorical thought fits into the picture" (Lakoff, *The Neural Theory of Metaphor*). Of the different types of metaphor, Hans Blumenberg's so-called absolute metaphor should be mentioned. This denotes a figure or a concept that cannot be reduced to, or substituted by, mere conceptual thought and language.

Works Cited

Blumenberg, Hans. *Paradigms for a Metaphorology.* Ithaca: Cornell University Press, 2010.

Boella, Laura. *Neuroetica. La morale prima della morale*. Milan: Raffaele Cortina Editore, 2008.

Clark, Andy and David J. Chalmers. *The Extended Mind*. Published in *Analysis* 58:10-23, 1998. Reprinted in (P. Grim, ed.) *The Philosopher's Annual*, vol XXI, 1998. Web. 24 April 2009. <http://consc.net/papers/extended.html>

Damasio, Antonio. *The Feeling of What Happens*. San Diego, NY, London: Harcourt, 2000.

Dehaene, Stanislas. *I neuroni della lettura*. Trans. by Corrado Sinigaglia. Milan: Raffaello Cortina Editore, 2009. Dickinson, Emily. *The Complete Poems of Emily Dickinson*. Boston: Little, Brown, 1924. Bartleby.com, 2000. Web. 21 Feb. 2012. <www.bartleby.com/113/>

Edelman, Gerald. *Wider than the Sky: The Phenomenal Gift of Consciousness*. New Haven and London: Yale University Press, 2004.Ferraris, Maurizio. *ANIMA e Ipad*. Parma: Guanda, 2011.Gallese, Vittorio and Georg Lakoff. "The Brain's Concepts: The Role of the Sensory-Motor System in Conceptual Knowledge." *Cognitive Neuropsychology* 22 (3/4) (2005): 455-479.

Gehlen, Arnold. "L'uomo e la tecnica." *L'uomo nell'era della tecnica*. Pref. by Antimo Negri. Milan: SugarCo Edizioni, 1984.

Hebb, Donald O. *The Organization of Behavior.* New York: Wiley & Sons, 1949.

Jandl, Ernst. *nichts und etwas*. *der gelbe hund. Gedichte.* Darmstadt/Neuwied: Luchterhand, 1997.

Kandel, Eric R., James H. Schwartz, and Thomas M. Jessel. *Principles of Neural Science*. New York: McGraw-Hill, 2000 [1981].

Koepsell, Killian and Carlos Spoerhase. "Neuroscience and the Study of Literature. Some Thoughts on the Possibility of Transferring Knowledge." *JLT*, 2:2 (2008): 363-374.

Lakoff, George, *The Neural Theory of Metaphor*. (January 2, 2009). Web. 10 Sept. 2012. <http://dx.doi.org/10.2139/ssrn.1437794>

Lakoff, George and Mark Johnson. *Metaphors We Live By.* Chicago, London: The University of Chicago Press, 1980.

Lauer, Gerhard. "Spiegelneuronen. Über den Grund des Wohlgefallens an der Nachahmung." *Im Rücken der Kulturen*. Ed. by Karl Eibl, Katja Mellmann, and Rüdiger Zymner.Paderborn: Mentis Verlag, 2007, 137-165.

Legrenzi, Paolo and Carlo Umiltà. *Neuro-mania. Il cervello non spiega chi siamo*. Bologna: Il Mulino, 2009.

Lehrer, Jonah. *Proust was a Neuroscientist.* Boston: Houghton Mifflin Harcourt, 2007.

Mangen, Anne and Jean-Luc Velay. "Digitizing Literacy. Reflections on the Haptics of Writing." *Advances in Haptics*. Ed. by Mehrdad Hosseine Zadeh. OA 2010. Web. 4 Sep. 2012. <http://intechopen.com/books/advances-in-haptics/digitizing-literacy-reflections-on-the-haptics-of-writing>

Mann, Thomas. *Schwere Stunde*. *Der Tod in Venedig*. Frankfurt a.M.: Fischer Taschenbuch Verlag, 1975.

Menary, Richard. "Introduction: The Extended Mind in Focus." *The Extended Mind*. Ed. by Richard Menary. Cambridge-Massachusetts-London: The MIT Press, 2010, 1-25.

---. "Cognitive Integration and Extended mind." *The Extended Mind*. Ed. by Richard Menary, Cambridge-Massachusetts-London: The MIT Press, 2010, 227-243.

Northoff, Georg and Alexander Heinzel. "First-Person Neuroscience: A new methodological approach for linking mental and neuronal states." *Philosophy, Ethics, and Humanities in Medicine* 1:3 (2006). Web. 4 Dec. 2012. <http://www.peh-med.com/content/1/1/3>

Oliverio, Alberto. *Prima lezione di neuroscienze.* Rome, Bari: Laterza, 2008.

Ong, Walter J. *Orality and Literacy: The Technologizing of the Word.* New York: Methuen, 1982.

Proust, Marcel. *Du côté de chez Swann*. Paris: Grasset, 1913. <www.gutenberg.org>

Ramachandran, Vilayanur S. "Mirror neurons and imitation learning as the driving force behind 'the great leap forward' in human evolution." Edge Foundation. 1 June 2000. Web. 3 March 2012.
<http://www.edge.org/3rd_culture/ramachandran/ramachandran_index.html>

Rizzolatti, Giacomo and Corrado Sinigaglia. *So quel che fai*. *Il cervello che agisce e i neuroni specchio*. Milan: Raffaello Cortina Editore, 2006.

Salgaro, Massimo. "Letteratura come 'Lezione della base cranica' (Durs Grünbein). Prospettive per l'estetica della ricezione." *BAIG* IV (January 2011): 49-62.

---. "L'opera letteraria si realizza nella coscienza del lettore. Estetica della ricezione, psicologia cognitiva e neuroscienze." *Verso una neuroestetica della letteratura*. Ed. by Massimo Salgaro. Rome: Aracne, 2009, 137-167.

Schacter, Daniel L. *Alla ricerca della memoria*. Trans. by Cristiana Mennella. Turin: Einaudi, 2001.

Schrott, Raoul and Arthur Jacobs. *Gehirn und Gedicht.* Munich: Hanser, 2011.

Searle, John R. *Freedom & Neurobiology*. New York: Columbia University Press, 2007.

---. *Minds, Brains and Science. The 1984 Reith Lecture*. Cambridge Massachusetts: Harvard University Press, 1984.

Snow, Charles Percy. *The Two Cultures*. London: Cambridge University Press, 1959; repr. 2001.

Sutton, John. "Exograms and Interdisciplinarity: History, the Extended Mind, and the Civilizing Process." *The Extended Mind*. Ed. by Richard Menary. Cambridge Massachusetts and London: The MIT Press, 2010, 189-225.

Wiktionary. Web. 20 Sept. 2012. <http://en.wiktionary.org/wiki/neuroenhancement>.

Art and Reality – Towards a Neuropsychological Theory of Aesthetic Perception

Ensaio

Katarzyna Kaczmarczyk | University of Warsaw (Warsaw,Poland)

In recent decades, neuroscience and particularly some fields of research under a common name of "neuroaesthetics" have exaggerated their possible contribution to humanities and the theory of the work of art. There are statements such as: "I am convinced that there can be no satisfactory theory of aesthetics that is not neurobiologically based. (...) I shall be surprised if such an understanding does not modify radically our view of ourselves and our societies' (Zeki, "Artistic Creativity and the Brain" 52). Claims such as this – though formulated after more than ten years of fast growing research – should still make us, and indeed they do make us, suspicious. On the other hand, claims similar to the one expressed by John Hyman that neuroaesthetics "does not say anything distinctive about artists. It tells us nothing about Picasso and Cezanne that doesn't apply equally to Häagen Dazs and MacDonalds" (245) also destroy our hope for a dialogue between disciplines. Nevertheless, out of all possible interests of aesthetics, aesthetic experience seems to be fairly compliant with empirical and experimental methods and has been the main point of interest of experimental aesthetics dating back to Fechner's *Vorschule der Aesthetic* (1876). As such, it could be a departure point for recreating a common ground between humanities and sciences.

In the above quote, Hyman formulates the most crucial accusation against neuroaesthetic inquiry into art. The author claims that neuroaesthetics reduces perception of art to perception of reality. However, what kind of tools – if not empirical methods – can help compare these two? Scientists know more and more about perception and attention, both on the psychological and the neurobiological

Citação: Katarzyna Kaczmarczyk, "Art and Reality – Towards a Neuropsychological Theory of Aesthetic Perception". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 163-178. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

level. If empirical research was used differently, that is, not as an end of the journey, but as a point of departure, than neuroscience could, possibly, serve as a tool to verify the already existing theories and become an inspiration for subsequent speculative inquiry.

This paper aims, thus, at addressing a few key questions: (1.) What can neuroscience tell about the difference between perceiving art and everyday reality?; (2.) Are there commonalities between perception of various forms of art (literature, painting, music) which differentiate them from perception of non-artistic objects?; (3.) What (on a neurobiological level) is the difference between artistic and non-artistic messages created through the same medium? The answer to these questions will, hopefully, lead to the creation of a preliminary neuropsychological sketch of aesthetic perception.

1. Aesthetic attention

The obvious seems to be a good starting point: both the perception of art and the perception of reality are attentional processes. The difference must lie in types of attention or in their proportions. However, attention is problematic when it comes to defining it accurately, let alone creating a coherent typology. There appears to be a tentative consensus when it comes to a classical distinction between bottom-up, stimulus driven, and top-down, goal driven attention. The first type, also known as involuntary, describes processing which is initiated by properties of the object, that is, we attend to them whether we want to or not. The second – voluntary – is under the control of the person who is attending to the stimulus.[1]

In the everyday world the goal of this selective concentration on one aspect of the environment or subject's own states is to guide him towards survival and reproduction. It is reactive towards unpredictable events in the world and someone's own short and long term goals. Attention must be selective in order to

"act as a means of focusing limited mental resources on the information and cognitive processes that are most salient at a given moment" (Sternberg 69).

Regarding the perception of art, we can distinguish two key stages: 1. discerning the work of art from the rest of the world; 2. focusing our attention on its content. Firstly, we have to recognize an object as a gestalt qualitatively different from the rest of the world by means of its physical properties and (or) by our understanding of its different ontological state, or using Danto's term, its affiliation to the "artworld' (571-584). The author of "The Transfiguration of the Commonplace" argues that the reason for the object to be perceived and attended to as art is not any physical property of that particular object, but the current state of the philosophy of art and our knowledge about it.[2]

The second stage is the attentional process guiding the person's encounter with the work of art: following the plot of a narrative, studying the painted images, focusing on a cinematic screen or theatrical stage. Some neuroaestheticians claim that in the case of art (at least in the initial stage of our encounter with it) the involuntary (bottom-up) attention can override voluntary processes (Markiewicz and Przybysz 120). This seems to be the logical extension of the belief that the structure of an artwork is designed to guide its addressees through itself by means of continuous alternating of anticipation and confrontation. However, the claim about the primacy of involuntary processing needs further developing and differentiating.

Polish philosopher Władysław Tatarkiewicz proposed two ideal types of aesthetic experience: dream and focus. These correspond to two types of attention: bottom-up and top-down:

> The difference between them is clear. When I try to penetrate the essence of these things or others, systematically juxtapose their properties, group them into general classes, compare them with other things, recognize their relations, their causes and purposes –

> then I take on an approach of a scholar. [focus] (…) A different attitude [dream], distinct even because of being more passive, is the one taken on by a person who merely watches an object, experiences it, absorbs its nature and beauty. This is the behavior of a wanderer towards the landscape, a viewer in a gallery, a listener of a concert, a reader of a novel. (Tatarkiewicz 72)

Tatarkiewicz refers to types of attention dominating in aesthetic experience. His classification is useful because it is broad enough to accommodate different forms of art. However, it should not lure us into believing that this distinction describes accurately the relation between an artistic object and its viewers' attention. The final attentional process is the result of the interaction of different variables: 1. "the artworld", canons, theories, socially acceptable forms of production and perception of art, all these influence the creation of artworks bearing specific properties and they can predispose the audience towards specific behavior, form of reception and type of attention;[3] 2. the artwork itself, which carries the influence of aesthetic theories and the intentionality of the author; 3. the viewer, who – to some extent – has control over his own attention and the way of engaging with art; the viewer's knowledge of "the artworld", his mental and physical state, which can shift his attention away from the aesthetic object or make him concentrate on its different aspects; 4. the environment, in which the person comes in contact with an artwork – it can favor or disfavor certain attitudes; it is often the outside environment, which can attract attention, by means of bottom-up processing, away from the work of art and towards some new external stimuli.

It is the viewer, who is in charge of his voluntary attention, type and length of his focus, the way of engaging with the object, but his decisions are based on the previous knowledge of art – which could be perceived as "the internalized artworld". Both the artwork as an external stimuli and the environment can override voluntary attention when presenting to the subject novel, unexpected and interesting stimuli. However, the claim that in perception of art involuntary

attention can override voluntary attention falls into the trap described by Hyman: it does not say anything new about art apart from stating that, as a part of the physical world, it follows the same biological rules. In everyday life there constantly are situations where involuntary processing overrides voluntary processing (Gerrig and Zimbardo 121-2). Art appears to do more: through the influence of both the artworld and the artwork, it guides the relation and proportion of voluntary and involuntary attention as a component of aesthetic experience.[4]

The ultimate shape of aesthetic attention – similarly to every attentional experience – is the outcome of 'negotiating' between the amount of information from the aesthetic object, the environment and the subject's own body and mind, as well as his limited mental resources and decisions how to spend them. The difference between perception of art and the everyday world is then a difference in the way we allocate mental resources and the way it influences our own mind.

2. Art and neural activation

It appears that, in comparison to reality, proportions of bottom-up and top-down processing are changed, although differently in various types and styles of works of art. In fact, Peirce and Nadal pointed out that both bottom up and top down processes are enhanced in the perception of art in comparison to perception of reality (Nadal and Pearce n. pag.). It would seem that this enhancement occurs both in the intensity and extent of neural activation and can be achieved through intensive selective stimulation of particular areas of the brain or extensive activation of areas 'normally' responsible for a particular modality and activation of additional areas – less active during the perception of non-aesthetic objects in the same modality.

Semir Zeki regards the works of artists such as Mondrian, Malewicz or Kandinsky as a means of selective intensive stimulation of the visual cortex. According to the scholar it can happen because "the artist is trying to represent the

essentials as constituted in his visual perception (…) - the brain" (Zeki, *Inner Vision* 111). The scholar shows how visual art not only intensively activates the whole visual cortex, but also activates – selectively – its specific areas:

1. V1 – primary visual cortex specializing in detecting edges and the direction of line movements,
2. V2 – prestriate cortex reacting to orientations of lines and some more complex patterns,
3. V3 – taking part in perception of shapes and movement,
4. V4 – responsible for the perception of colour,
5. V5 (MT) and V5a (MST) – reacting to movement (Zeki et al. 641-9).

Zeki, emphasizing a relative autonomy of some structures of the visual cortex and showing that they are not only places of processing information but also places of perception, tries to prove the hypothesis that selective activation of these areas can contribute to the feeling of aesthetic enjoyment (Zeki, *Splendors and miseries of the brain* 65-72).

Ramachandran believes that the difference in intensity of neural activation between non-artistic and artistic objects arise not only from selective activation, but also from such properties of works of art as peak shift principle, perceptual grouping, contrast, symmetry (15-51). He proposes to look at the transition from reality to objects depicted in artworks as a process of creating a caricature (a super-stimulus).[5] Following his chain of thoughts and applying it to other arts, one could characterize literature as the shift from daily language to its enhanced form acting as a super-stimulus. Of course, many similar theories have been formulated in the course of history. One such example is the concept of literariness which was developed among the representatives of the Russian formalist school (cf. Shklovskij 3-24) and redefined by Roman Jakobson in his concept of poetic function (Jakobson 350-77). Ramachandran's concept of art as a super-stimulus enhancing neural processing is surprisingly similar to the concept of literarieness. Both have a

comparable effect on neural activity: the enhanced communication activates the brain more intensively than a non-aesthetic one formed in the same modality.

The way the shift from ordinary to enhanced language is achieved according to formalists is through the process of defamilarization through the use of language devices such as metaphor, irony, alliteration, synesthesia, among other. On the neurobiological level such a change causes intensification of processing in the right hemisphere, which plays an important role in connotation coding. Howard Gardner describes in his book *A shattered mind* how difficult the perception of this enhanced language would be without the work of the right hemisphere, that is, when the right hemisphere does not perform its functions due to lesions or corpus collosotomy: "The patient is responsive chiefly to linguistic input, to the denotations of words and not to their nuances or connotations; he is glaringly insensitive to such factors as tone of voice, the spirit in which a query is put, and other environmental cues that might suggest one as against another response" (Gardner 372). Current research reaffirms the role that the right hemisphere plays in connotation coding. Remote associations between words are identified faster, if they are presented to the left visual field (Beeman 267; Kane 21-59).

Defamiliarization engages in processing some parts of the brain which ordinarily would be less involved. It can happen on the preconscious or conscious level, and the best example of the journey from one to the other is priming: an implicit memory effect in which exposure to a stimulus influences a response to a later stimulus. It can occur following perceptual, semantic, or conceptual stimulus repetition and plays a crucial role in understanding metaphors (Gagne, Friedman and Faries). Patrick Hogan links priming and the problem of emotional reaction to events in fictional worlds – he believes that when we observe the narrative unfolding, our own memories are primed causing us to feel real emotions towards fictional events (Hogan 164-79; Kohn 121-33). Our emotional reaction, according to

Hogan, would be than a peculiar fallacy of a false attribution and could be described as yet another example of enhanced neural activation.

All mentioned processes (selective activation, greater involvement of the right or left hemisphere in processing commonly more reliant on the other hemisphere, perceptual grouping, priming) do not explain the phenomenon of art on their own. However, they add to the described process of intensyfying neural activation in aesthetic perception.

3. "Costly" aesthetic attention

The previous considerations raise the following issue – the enhanced aesthetic attention and perception happens at the expense of the observation of the outside world – it closes viewers to it and makes them more prone to dangers coming from it. In other words – perception of art changes reactions to the outside world – it weakens them (of course only up to a point when the stimulus from the outside world exceeds the threshold of the involuntary attention and draws the attention out of the 'artworld' to the 'real-world') and slows them down.

Following the theory of a costly signal, we can – after Jean-Marie Shaeffer – call aesthetic attention 'costly attention'.[6] It is then the type of mental activity which takes up a lot of a person's resources and makes him or her vulnerable to danger by prolonging his or her time of reaction. However, being able to pay the price of sending such a signal can be profitable for an individual.[7]

Distance towards non-aesthetic reality is derivative from attention to the content of the work of art. As a result one can often lose oneself in the depicted world, forgetting about one's surroundings, a feeling similar to the one experienced during meditation or the experience of flow ceased by inhibition of some bottom up signals in the thalamus.[8] Habituation can be also connected with the feeling of 'loosing oneself' in the work of art. We define it as the decline in response caused by repeated exposure to the stimulus. Such a prolonged attention to the work of art

gradually desensitizes us to some stimulus from the outside world, helping us to forget about it. This is a common experience of book readers and cinema goers, and the feeling can happen easier if an individual is not moving and does not have to control actions of his or her body.

In terms of discussed types of attention we could describe the state of loosing oneself in a work of art as a partial inhibition of the bottom-up processing caused by voluntary focus on all that comes from one stimulus. What is than enhanced is top-down processing and bottom-up processing coming from an area defined as artistic. It means following the work of art and letting it guide the process without interruptions from the outside. Tatarkiewicz would call this state dream-like and associate it with a more populist way of experiencing art. On the other side of his distinction was "focus", which is associated with predominance of top-down control and means both distancing oneself from the outside world and one's own involuntary perception.

Both sides of this imaginary axis share an important property: an individual, while concentrating on the described events, does not react to them. This remark justifiably reminds us of Kant's term "Interesselosigkeit" (Part I, bk 1.2). However, Kant's term is connected with not using the work of art for any reason extraneous to the aesthetic enjoyment. According to the subject that occupies this paper, "not reacting" means rather not acting on events occurring in the described work, like running away from a shot fired from a rifle in a painting or answering a character asking a question in a movie. It does not seem to be a problem worth studying, but, as it turns out, there is a complicated mental process enabling perceivers not to react to depicted or described events.

4. Neuropsychology of "not reacting"

It turns out that imitation and action impulses are a constant part of our functioning. They are caused by cells called mirror neurons discovered in the 80s

and the 90s by a group of Italian scientists. These neurons fire both when an animal performes an action and when it observes the same action performed by another. Thus, the neurons "mirror" the behavior of the other, as though the observer was itself acting and by doing so they play a fundamental role in action understanding and imitation (Rizzolatti and Craighero 169-192). Scientists found these neurons directly in primates and birds. In humans, brain activity consistent with that of mirror neurons has been observed in the premotor cortex, the primary somatosensory cortex, the supplementary motor area and the inferior parietal cortex. What is even more important is the fact that impulses to actually act and mimic the scene observed precede the mirror neurons reaction. We do not do it because they are immediately inhibited by the orbitofrontal cortex. As Rizzolatti and others point out: "The parieto-frontal circuits that control action are, in normal individuals, tonically inhibited by frontal lobe. (...) It has been shown that during action observation, in parallel with motor cortex excitation, there is an inhibition of motor neurons in the spinal cord" (Rizzolatti et al. 142-3). Marco Iacobini suggests that there are special mirror neurons which inhibit imitative impulses send by other mirror neurons, and similarly to Fuster, localizes them in the orbitofrontal cortex. Interestingly enough, imitative impulses are not necessarily completely inhibited while appreciating art. Vittorio Galleze and David Freedberg evoke the reaction of viewers that, while looking at Michaelangelo's sculptures, feel an increase in the tension of the same muscles highlighted by the sculpted figures in their poses and movements (Galleze and Freedberg 197).

Inhibition of action perfectly exemplifies the problem of integrating a neurobiological and (here) a sociological perspective. On the one hand, damage to prefrontal cortex can lead to the inability to inhibit impulses, which makes all kinds of concentration (including the aesthetic) impossible. This is called a dysexecutive syndrome (Fuster 165). On the other hand, the ceasing of inhibition can be the result of a lack of knowledge regarding the conventions of art. Stendhal provides a

good example when he recalls a disturbing event which took place in Baltimore in 1822: a soldier who went to the theatre to see *Othello* became out of control and actually killed the actor playing Othello to punish him for his mistreatment of Desdemona on stage (Stendhal 22).

Inhibition of action is connected with ceasing reality testing. This psychoanalytic term represents the whole conglomerate of processes which enable us to differentiate reality and other products of consciousness (such as fantasies or memories) and consequently makes it possible to tell the difference between reality and fiction (Avery 228-261). This ability of Homo sapiens played a crucial role in its survival. No wonder that children as young as six months understand the concept of reality, probability and casual relations (Leslie and Keeble 265-88; Watson 152-60).

Nevertheless, when we watch a movie, read a novel or look at a painting, we often surrender to the illusion and believe without a constant process of reality testing. The more we believe, the easier it is to emotionally respond to the work of art. This paradox can be connected with one evolutionary determined characteristic of reality testing. When our ancestors, wandering around in search of food and shelter, thought they saw a wild animal or a snake their first reaction was to ran away and only later, when they felt safe, would they check if the thing from which they had ran away was actually real or simply an illusion. This order of actions was and still is safer. Daniel T. Gilbert suggests, that first we believe in everything we see to subsequently disbelieve (107-19). Norman Holland formulates another hypothesis: he argues that during our encounters with art, we switch off our reality testing system, because we treat a work of art as something that we cannot change or act upon it (59-75). Inhibition of action would be then directly connected to ceasing reality testing. As Prentice and Gerrig explain: “Belief in fiction is determinated not by a critical analysis... but instead by the absence of motivation or ability to perform such an analysis” (542). Holland expands the argument:

> We believe because we do not reality-test, and we do not reality-test because action on the stimulus is ontologically impossible. (...) A brain serves one basic purpose, moving a body in the real world toward survival and reproduction. Intending to move in the real world involves imagining counterfactuals, and therefore testing reality and judging probabilities. If we know that, by its very nature, we cannot affect what we are paying attention to, as is the case with literary and artistic works, we inhibit motor impulses from our frontal lobes. We may then disregard whether what we are perceiving is true or not. We may shut down our judgements of realism or probability. If we do, we have granted 'poetic faith' in Coleridge's sense. (Holland 66, 72-3)

The aim of this paper was to explore the notion of aesthetic perception from a neuropsychological perspective by focusing on what distinguishes it from non-aesthetic perception. What emerges is perception characterized by:

- different proportions of voluntary and involuntary attention;
- intensification of both bottom-up and top-down processes;
- engagement of some parts of the brain which ordinarily would be less involved in the processing;
- limited attention towards the outside world;
- inhibition of imitative and reactive signals;
- ceasing reality testing and thus believing in fiction, that is, having real emotional reaction towards fictional characters and events.

These characteristics, based on existing neuroscientific inquiry into perception of art while not complete, shows important differences between perception of art and perception of reality. The mentioned points – here only tentatively presented – should be understood as propositions for further inquiry; the kind of inquiry in which both humanists and neuroscientists should be engaged in dialogue.

[1] This classical distinction was introduced by William James in "The Principles of Psychology" first published in 1890. Nowadays it appears simplistic, but still serves a purpose of distinguishing some characteristics of attentional processes.

[2] Danto, while addressing the problem of relation of art and reality, shiftes our attention to the outside factors, external to the work of art itself. These factors enable an object to be perceived as artistic. Some neuroaesthetic reasearch could be complementary to this line of thinking. Scientists currently test the influence of contextual information on aesthetic experience (cf. Lengger, Fischmeister, et al.; Kirk, Skov, et al.).

[3] Behaviour towards art is also culturally coded and as such undergoes changes in time. A good example of it is literature. Silent, private reading, as a basic form of contact with literature, definitely influences attentional processes engaged in the activity, and further distinguishes a literary reading from other forms of language communication. However, forms of engaging with the literary work are subjected to historic change. According to Karin Littau, silent reading spreaded in 18th century and initialy met with a wave of criticism towards the effect of "loosing yourself" in the book and getting engaged and immersed in the plot (20).

[4] The inherent part of research on genres and styles should be an examination of the type of aesthetic perception provoked by them.

[5] Arguments made by Ellen Dissanayake force us to compare the neurobiological perspective to the evolutionary one. The difference between artistic and non-artistic communication is similar to the difference between communication between adults and between adults and infants, where signals are stereotyped, exaggerated and repetitive. According to Dissanayake this type of 'enhanced' communication appeared about 1.8 million years ago, when – with the shorter gestation period – natural selection favoured strategies developed by mothers in order to provide care during the period of early infancy of their children.

[6] Jean-Marie Schaeffer presented this thesis during a lecture entitled *Aesthetic relationship, cognition and pleasure*, which was held on April 19, 2012, at the Faculty of Polish Culture, University of Warsaw.

[7] "Costly signals", such as peacock's tails, unable other subjects to distinguish between true and false signals of sexual attractiveness. They give a bigger chance of proving genuine, because they are difficult to imitate. There are theories, which recognize altruism and religious practices as "costly signals". Schaeffer claims that art production and appreciation also can be studied as a "costly signal" (cf. note 6).

[8] This part of the brain can be called a base transceiver station, because majority of ingoing information must go through the thalamus to get to the cortex.

Works Cited

Beeman, Mark. "Coarse semantic coding and discourse comprehension." *Right hemisphere language comprehension: perspectives from cognitive neuroscience*. Ed. by Mark Beeman, Christine Chiarello. Mahwah, N.J.: L. Erlbaum Associates, 1998.

Danto, Artur. "The Artworld." *Journal of Philosophy* LXI (1964): 571-584.

Dissanayake, Ellen. "In the beginning: Pleistocene and infant aesthetics and 21st-century education in the arts." *International handbook of research in art education*. Ed. Liora Bresler, Dordrecht: Springer, 2007, 783-798.

---. "What art is and what art does: An overview of contemporary evolutionary hypotheses." *Evolutionary and neurocognitive approaches to aesthetics, creativity and the arts*. Ed. by Colin Martindale, Paul Locher, Vladimir M. Petrov. Amityville, NY: Baywood, 2007, 1–14.

Fechner, G.T. *Vorschule der aesthetik*. Breitkopf & Härtel, 1876.

Freedberg, David and Vittorio Gallese. "Motion, emotion and empathy in esthetic experience."*Trends in Cognitive Sciences*, 11 (2007): 197-203.

Fuster, Joaquin M. *Cortex and Mind: Unifying Cognition*. Oxford, New York: Oxford University Press, 2003.

Gagne, Christina, Alinda Friedman and Jeremiah Faries. "Effect of priming on thecomprehension of predicative metaphors." *Metaphor & Symbolic Activity* 11 (1996): 125-143.

Gardner, Howard. *The shattered mind: the person after brain damage*. New York: Knopf, 1975.

Gerrig, Richard J. and Philip G. Zimbardo. *Psychology and life*. Boston, Allyn&Bacon, 2010.

Gilbert, Daniel T. "How Mental Systems Believe." *American Psychologist* 46 (1991): 107-119.

---. "How Mental Systems Believe: Reply." *American Psychologist* 47 (1991): 670-671.

Hogan, Patrick C. "Toward a cognitive science of poetics: Anandavardhana, Abhinavagupta and the theory of literature." *College Literature*, 23 (1996): 164-179.

Holland, Norman N. *Literature and the brain*. Gainesville: The PsyArt Foundation, 2009, 59-75.

Hyman, John. "Art and neuroscience." *Beyond mimesis and convention. Representation in art and science*. Ed. by Roman Frigg, Matthew C. Hunter. Dordrecht–Heidelberg–London–New York: Springer 2010, 245-262.

Jakobson, Roman. "Linguistics and Poetics." *Style in Language.* Ed. by Thomas Sebeok. Cambridge, MA: M.I.T. Press, 1960, 350-377.

James, William. *The Principles of Psychology*. New York: Cosimo, Vol. 1, 2007.

Lengger, P.G., F.P.S. Fischmeister, H. Leder, H. Bauer. *Functional neuroanatomy of the perception of modern art: a DC-EEG study on the influence of stylistic information on aesthetic experience*. *Brain research,* nr 1158 (2007).

Kane, Julie. "Poetry as right-hemispheric language." *Journal of consciousness studies*, 11 (2004): 21-59.

Kant, Immanuel. *Critique of the Power of Judgment*. Trans. and ed. Paul Guyer and Eric Matthews. Cambridge, UK; New York: Cambridge University Press, 2000.

Kantner, John and Kevin J. Vaughn. "Pilgrimage as costly signal: Religiously motivated cooperation in Chaco and Nasca." *Journal of Anthropological Archaeology*, 31 (2012): 66-82.

Kirk, U., M. Skov, O. Hulme, M.S. Christensen, S. Zeki. *Modulation of aesthetic value by semantic context: an fMRI study*. *Neuroimage*, nr 44 (2009).

Kirk, U., M. Skov, M.S. Christensen, N. Nygaard. *Brain correlates of aesthetic expertise: a parametric fMRI study*. *Brain and cognition*, nr 69 (2009).

Kohn, Liberty. "Objects and literary emotion: memory and phenomena in cognitive poetics." *Neohelicon*, 35 (2008): 121-133.

Leslie, Alan M. and Stephanie Keeble. "Do Six-Month-Old Infants Perceive Causality?" *Cognition*, 25 (1987), 265-288.

Littau, K. *Theories of Reding. Books, Bodies and Bibliomania*. Cambridge: Polity Press, 2006.

Markiewicz, Piotr and Piotr Przybysz. "Neuroestetyczne aspekty komunikacji wizualnej i wyobraźni." *Obrazy w umyśle. Studia nad percepcją i wyobraźnią*. Ed. by Piotr Francuz. Warszawa: Scholar, 2007, 111-148.

Millet, Kobe and Siegfried Dewitte. "Altruistic behavior as a costly signal of general intelligence." *Journal of Research in Personality*, 41 (2007): 316-326.

Nadal, Marcos and Marcus T. Pearce. "The Copenhagen Neuroaesthetics conference: Prospects and pitfalls for an emerging field." *Brain and Cognition* (2011). <doi:10.1016/j.bandc.2011.01.009>

Prentice, Deborah A. and Richard J. Gerrig. "Exploring the Boundary Between Fiction and Reality." *Dual-Process Theories in Social Psychology*. Ed. by Shelly Chaiken, Yaacov Trope. New York: Guilford Press, 1999, 529-546.

Ramachandran, Vilayanur S. and William Hirstein. "The science of art. A neurological theory of aesthetic experience." *Journal of consciousness studies*, 6-7 (1999):15-51.

Rizzolatti, Giacomo and Laila Craighero. "The Mirror-Neuron System." *Annual Review of Neuroscience*, 27 (2004): 169-192.

Rizzolatti, Giacomo, Luciano Fadiga, Vittorio Gallese, Leonardo Fogassi. "The Inferior Parietal Lobule: Where Action Becomes Perception." *Percept, Decision, Action: Bridging the Gaps*. Ed. by Derek J. Chadwick, Mathew Diamond, Jamie Goode. Hoboken: Wiley, 2006, 129-145.

Shklovskij, Viktor. "Art as Technique." *Russian Formalist Criticism. Four Essays.* Trans. by Lee T. Lemon, Marion J. Reis. Lincoln: University of Nebraska Press, 1965, 3-24.

Stendhal. *Racine and Shakespeare*. Trans. by Guy Daniels. New York: Crowell-Collier Press, 1962.

Sternberg, Robert Jeffrey. *Cognitive psychology*. New York: Harcourt Brace, 1996.

Tatarkiewicz, Władysław. *Skupienie i marzenie. Studia z zakresu estetyki*. Kraków: M.Kot, 1951.

Watson, John S. "Bases of causual inference in infancy: time, space and sensory relations." *Advances in infancy research*, vol. 3. Ed. by Lewis P. Lipsit, Carolyn Rovee-Collier. Norwood: Ablex Publishing, 1984, 152-160.

Weisman, Avery D. "Reality sense and reality testing." *Behavioral Science*, 3 (1958), 228-261.

Zeki, Semir. *Splendors and miseries of the brain: love, creativity, and the quest for human happiness*. Chichester, UK; Malden, Mass.: Wiley-Blackwell, 2009.

---. "Artistic creativity and the brain." *Science New series*, Vol 293, No. 5527 (Jul 6 2001): 51-52.

---. *Inner vision: an exploration of art and the brain*. Oxford: Oxford University Press, 1999.

Zeki, Semir, J.D.G. Watson, Christian J. Lueck et al. "A direct demonstration of functional specialization in human visual cortex." *Journal of neuroscience*, 11 (1991): 641-649.