R.L. Edgeworth and optical telegraphy in Ireland, *c.* 1790-1805

I_________________,
do swear, that I will neither directly nor indirectly endeavour to discover any communication, which is intended should be concealed from me, or disclose, or permit to be disclosed anything entrusted to me concerning the business of the telegraph.

Oath for the Edgeworth Telegraphic Establishment Corps [1]

Introduction

In 1804 Richard Lovell Edgeworth began transmitting telegraphic messages from Dublin, on the east coast of Ireland, to Galway, on the west coast. Claims of rapid transmission speeds appeared in national newspapers and great excitement was provoked by this marvel of modern science. Its potential as a means of secret military communication was self-evident. Edgeworth's optical telegraph was but one of many that appeared in Europe in the period following the French Revolution.

Edgeworth was to fashion his invention as a military communication device; thus, securing state support was essential for its success. This paper will seek to understand the many spheres of influence that inventors had to infiltrate and persuade in order to secure the patronage needed to implement their inventions. It will look at the early development of Edgeworth's 'tellograph' and seek to understand his use of display in its promotion. It will trace the development of Edgeworth's optical tellograph in the context of a rapidly changing political, and security, situation in late eighteenth- and early-nineteenth-century Ireland. By enquiring into the role that political, military, economic and social factors had on the introduction and failure of this invention.

While there have been some useful surveys of optical telegraphy, in particular the French Chappe system, the subject is under-researched.[2] By comparison, there is a much

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[1] National Library of Ireland (NLI), Edgeworth Papers (EP): Ms8182/11; Edgeworth to Littlehales [n.d.].
[2] For example Geoffrey Wilson, *The old telegraphs* (London & Chichester, 1976), 120-52; G. J. Holzmann and Bjorn Pehrson, *The early history of data networks* (Los Alamitos, 1995); Howard Mallinson, *Send it by semaphore: the old telegraph during the wars with France* (Crowood, 2005);

larger body of scholarship on the electric telegraph. These studies have enquired into various aspects of the technology's invention and development[3] and its use to regulate society.[4] There is also an extensive literature on international telegraphy and cable networks.[5] For those seeking to understand the social impacts of telegraphy, there have been particularly important contributions by Daniel Headrick, D.P. Nickles and others.[6] Of particular relevance to this study are those works which have sought to understand the importance of exhibition in promoting new technologies.[7]

Optical telegraphy

Two early advocates of a communication system which utilised the telescope were John Wilkins and Robert Hooke. By 1684, Hooke, curator of experiments at the Royal Society, was proposing a system which combined a telescope and signalling.[8] Wilkins, a fellow of the Royal Society, in 1694 published *Mercury, or the secret and swift messager, showing how a man may with privacy and speed communicate his thoughts to a friend.* Most of this book was concerned with the secret relaying of coded information in verbal or written form; however, it also dealt with the transmission of information over distance.[9]

Frank Hellemans, 'Napoleon and internet: a historical and anthropological view on the culture of punctuality and instantaneity', *Telematics and Informatics*, 15 (3) (1998), 127-133.

[3] For example Jeffrey L. Kieve, *The electric telegraph: a social and economic history* (Newton Abbot, 1973); K.G. Beauchamp, *History of telegraphy* (London, 2008).

[4] Iwan Rhys Morus, 'The nervous system of Britain": space, time and the electric telegraph in the Victorian age', *British Journal for the History of Science*, 33:4 (2000), 455-76.

[5] For recent examples see Roland Wenzlhuemer's *Connection the nineteenth-century world: the telegraph and globalisation* (Cambridge, 2012); R.M. Pike and Dwayne Winseck, *Communication and empire: media, markets, and globalization, 1860-1930* (Durham, 2007).

[6] D.R. Headrick, *The tools of empire: technology and European imperialism in the nineteenth century* (Oxford, 1981); D.R. Headrick, *The invisible Weapon: telecommunications and national politics, 1851-1945* (Oxford, 1991); D.P. Nickles, *Under the wire: how the telegraph changed diplomacy* (Harvard, 2003).

[7] For example see I.R. Morus, 'The electric Ariel: telegraphy and commercial culture in early Victorian England', *Victorian Studies,* 34:3 (2000), 339-78; Ben Marsden and Crosbie Smith, *Engineering empires: a cultural history of technology in nineteenth-century Britain* (Basingstoke, 2004).

[8] Steven Shapin, 'Who was Robert Hooke?', in Michael Hunter and Simon Schaffer (eds), *Robert Hooke: new studies* (Woodbridge, 1989), 253-285; 253.

[9] John Henry, 'Wilkins, John (1614–1672)', in Matthew and Harrison (eds) *Oxford Dictionary of National Biography*.

R.L. Edgeworth, an inventor and writer, was born in Bath, in 1744, and spent much of his early life in Britain. He was the son of an Anglo-Irish landlord whose family gave their name to the town of Edgeworthstown, Co. Longford. He studied at Trinity College, Dublin, and Corpus Christi College, Oxford, and the Middle Temple, London.[10] His interests were wide ranging, including a fascination with the mechanical arts and science. In 1781 he became a member of the Royal Society, of London. More importantly, he also became involved in an informal group of prominent gentleman and industrialists, based in Birmingham, who were interested in applying science to practical uses. Known to posterity as the 'Lunar Society', its members, including Edgeworth, Matthew Boulton, Josiah Wedgewood, Erasmus Darwin, Joseph Priestly and James Watt, were to make significant contributions to Britain's industrial and scientific development.[11]

In 1782 Edgeworth returned to Ireland to manage his inheritance; despite this, his financial situation while comfortable was not overly prosperous, the main part of his estate was bog land and he had twenty surviving children from several marriages. Upon his return to Ireland he identified with the patriot volunteers, being appointed one of Lord Charlemont's—the commander-in-chief—aides-de-camp, in 1783. He was noted for his decency in dealing with tenants, both catholic and protestant. In 1798 he was elected to the Irish parliament as M.P. for St Johnstown. He was to vote against the Act of Union; despite being personally in favour he stated that he could not vote for something which the vast majority of the population were against. [12]

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[10] Richard Edgeworth and Maria Edgeworth *Memoirs of Richard Lovell Edgeworth, Esq.* (2 vols, London, 1820), vol. 1, 21-2.

[11] Desmond Clarke, *The ingenious Mr Edgeworth* (London, 1965), 53-4, 100; Jenny Uglow, *The lunar men: the friends who made the future, 1730-1810* (London. 2002), ix, xiii-xiv; 124-5, 181-2, 314-6.

[12] Clarke, *The ingenious Mr Edgeworth,* 30: 106-13,172-4; John S. Moore, 'Richard Lovell Edgeworth' in James McGuire and James Quinn (eds*), Dictionary of Irish Biography.* (Cambridge, 2009) [http://dib.cambridge.org/, accessed on 15 Dec. 2015]

According to Edgeworth, he began experimenting with the visual transmission of information over distance in 1767, using knowledge that he had acquired from reading John Wilkins's and Robert Hooke's works.[13] However, while the system was technologically sound, there was little hope of it becoming a practical tool for communication given the cost of erecting and manning such an invention.[14]

Men such as Hooke, Wilkins and Edgeworth saw these experiments as a way of demonstrating the applications of the science of optics.[15] Thus, long-distance communication by visual means was nothing more than a curiosity. Such inventions had no practical market to support the maintenance of a permanent communication system. The creation of such a market was a challenge that faced the 'inventors' of electric telegraphs such as Francis Ronald, whose telegraph operated using static electricity, and Charles Wheatstone and W.F. Cooke, inventors of the more widely known electro-magnetic telegraph. These inventors and their telegraphs provide an insight into notions of technological success and failure.

As Graeme Gooday has highlighted, stories of technological success, or failure, are problematic, the central difficulty is establishing criteria with which to judge a technology. The idea that technological success is based purely on quality of design has been discredited; rather, success or failure is as much a social construction as a technological one. Ben Marsden has demonstrated the nuances of these labels during the development and implementation of technologies. Technologies that actually work within the parameters set out by their inventors were, if only for a time, considered successful. However, as the criteria of success changed so too could the technology's status. Therefore, it is important to judge success or failure using the standards of contemporaries.[16] Thus, for the inventors of electric

[13] Clarke, *The ingenious Mr Edgeworth*, 30; Wilson, *The old telegraphs*, 103.
[14] Wilson, *The old telegraphs*, 103.
[15] Michael Hunter and Simon Schaffer, 'Introduction', in Michael Hunter and Simon Schaffer (eds), *Robert Hooke: new studies* (Woodbridge, 1989), 1-19: 5, 7-8, 17-8.
[16] Graeme Gooday, 'Re-writing the "book of blots": critical reflections on histories of technological "failure"', in *History and Technology*, 14 (1998), 265-291: 268-71; Ben Marsden, 'Blowing hot and cold: reports and

and optical telegraphs long-term success would only be possible with the construction of communication networks. In order to succeed, these inventors issued ‘manifestos of promises’, fashioning themselves as authority figures and creating the perception of uses that their innovations could satisfy.[17]

Francis Ronald’s telegraph used pith-ball electrometers to alert operators at each end when a telegraph line was charged. The operators were equipped with synchronised rotating dial devices that displayed the letters of the alphabet, excluding J, Q, U, W, X and Z, and the digits one to ten, one symbol at a time. To transmit a message the operator would simply wait until the letter/digit that they wanted to send appeared on their dial and then discharge the current in the telegraph line, by touching it. The pith-balls at the other end of the line would collapse and the operator would note the letter/digit displayed. The line would be recharged and the process repeated until the message was sent.[18] Roland approached the Admiralty with a view to replacing its existing optical telegraph system, connecting London to Portsmouth and Plymouth. However, the Admiralty saw no additional benefit in his scheme and, thus, with no users the innovation was never to become financially viable.[19]

Wheatstone and Cooke’s telegraph was based on experimentation with electricity and magnetism that took place throughout the early nineteenth century. In June 1837 they patented their first telegraph. This was a six-wire, five-needle instrument which displayed twenty letters.[20] The main difficulty they faced was not constructing their telegraph but convincing funders that a market existed for long-distance telegraphy. Unlike Roland they did not appeal to the traditional user of telegraphs, the military, but instead created a market

retorts on the status of the air-engine as success or failure, 1830-1855’ in *History of Science*, 36 (1998), 373-420: 411-2.
[17] Marsden and Smith, *Engineering empires*, 179-80.
[18] Francis Roland, *Descriptions of an electrical telegraph* (London, 1823), 6-8.
[19] Marsden and Smith, *Engineering empires*, 186-7.
[20] Kieve, *The electric telegraph: a social and economic history,* 21-3.

initially based on railway safety and management.[21] Hence, the success of Wheatstone and Cooke's telegraph relied on their ability to convince others of its utility, thereby securing the necessary funding to maintain and grow their telegraph system.[22]

The cases of Roland's, and Wheatstone and Cooke's, telegraphs demonstrate that it was not simply enough to invent a device for transmitting information rapidly across vast distances. As Lynne Hamill explains 'technology is not exogenous: it does not simply appear and then society adapts to it. Society creates technology and decides if and how to use it.'[23] Consequently, it was essential for an inventor to not only create a new technology but also the perception of a market for it. Hence, the central questions for this study are what conditions were prevalent in the 1800s which saw the uptake of optical telegraphs and why was Edgeworth's telegraph was ultimately unsuccessful?

Interest in optical telegraphy

One of the central events in the development of optical telegraphy was the French Revolution. Revolutionary France quickly found itself engaged in open warfare with the conservative monarchies of Europe and, from 1793, Britain. It was thus in the context of heighted political and military tensions that methods of communication over distances by visual means were revisited in a number of countries. In France the designs of Claude Chappe were adopted by the fragile regime, allowing it to communicate rapidly with its military forces and civil administration by overcoming the natural barriers of space and time.[24] Chappe's telegraph consisted of a five-metre pole placed on top of a telegraph station with a pivoting four-and-a-half metre bar called a 'regulator' attached. At the each end of this was a

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[21] I.R. Morus, 'The electric Ariel: telegraphy and commercial culture in early Victorian England', 339-78: 341; see also W. F. Cooke, *Telegraphic railways* (London, 1842).
[22] Marsden and Smith, *Engineering empires*, 187-97.
[23] Lynne Hamill, 'The social shaping of British communications networks prior to the First World War', *Historical Social Research,* 35:1 (2010), 260-86: 261.
[24] Hellemans, 'Napoleon and internet', 129-131.

rotating two-metre, 'indicator', bar, allowing for 196 possible signals (fig. 1).[25] A working system was in place between Paris and Lille by 1794, consisting of fifteen stations and covering 148 miles.[26]

Following the implementation of Chappe's telegraph in France there was heightened interest in the technology in Britain and Ireland. Frederick, Duke of York, seeking to develop a field telegraph for use by the army, had two models and a drawing of the French telegraph, along with Chappe's alphabet, delivered to his chaplain, Rev. John Gamble.[27] Gamble set to work exploring methods of sending information over great distances, publishing the results in 1795 as *Observations on telegraphic experiments.* The work's purpose was to 'obtain an intelligible figurative language, which may be distinguished at a distance, and by which the obvious delay in the dispatch of orders or information by messenger may be avoided.'[28] Gamble discounted many forms of communication, including the use of electricity; his solution was a five-shutter device (fig. 2). These shutters would open and close forming sequences of visual codes which would relate to the alphabet.[29] In 1796, the Admiralty constructed the six-shutter system of Lord George Murray. This remarkable system could relay information from Whitehall to Portsmouth in fifteen minutes.[30]

Optical telegraphs were adopted in many other jurisdictions; however, none would develop networks as extensive as the French. The main reason was cost: optical telegraphy was highly labour intensive. Stations were on average not further than twelve kilometres apart with a staff of five at each.[31] Resistance to technological innovation by the Royal Navy

[25] Beauchamp, *The history of telegraphy*, 6.
[26] J. C. MacKechnie, 'The history of electrical engineering, part 5: the origins of and development of the electric telegraph', in *Journal of the Institute of Electrical Engineers,* 2:15 (1956), 130-7: 132.
[27] Ibid., 11.
[28] John Gamble, *Observations on telegraphic experiments* ([London], [1795]), 5.
[29] Gamble, *Observations on telegraphic experiments*, 10-11.
[30] Beauchamp, *The history of telegraphy,* 4-6.
[31] Ibid, 8,17.

was also a feature of this period.[32] While France, a land-based power, made extensive use of this technology other countries did not attach the same importance to telegraphic communication. In Britain, the speedy relaying of information to the army was not the priority that it was for France; instead the navy, forming the mainstay of Britain's defence, was the only real candidate for this state-funded and expensive technology.

Irish telegraphy

Ireland was not immune to the revolutionary impulses that had ignited the French Revolution. By the early 1790s two radical organisations, the United Irishmen and the Defenders, were of concern to the government. In 1793 Britain declared war on revolutionary France and moved to crush the United Irishmen in Ulster.[33] However, the state was increasingly concerned about an insurrection in Ireland, while it was simultaneously at war with France. This anxiety was stoked by the French desire for revenge for British inference in the civil war in Vendée, by 1794 fears of a French landing and indigenous rebellion in Ireland were rife.[34]

Realising the potential utility of a rapid communication system in the defence of Ireland, and conscious of the chance to promote his project, Edgeworth was quick to offer his services to the government. As outlined above, Edgeworth was one of several inventors who realised that the military escalation of the 1790s provided an opportunity to market optical telegraphy as a tool of military communication. In his efforts, Edgeworth was to involve a number of his offspring, in particular his son Lovell and his daughter Maria. Maria Edgeworth, a famous author in her own right, helped to compile a telegraph vocabulary. Due

[32] For an insight into the difficulties facing innovators see Roger Morriss, 'Ideology, authority and the politics of innovation in the Royal Dockyards, 1796-1807' in *Journal for Maritime Research*, 14:1 (2014), 15-27.
[33] Marianne Elliott, *Partners in revolution: the United Irishmen and France* (New Haven & London, 1982), 32, 35, 40, 44; Jim Smyth, *The men of no property: Irish radicals and popular politics in the late eighteenth century* (2nd ed., London & New York, 1998), 101; Jim Smyth, 'Introduction: the 1798 rebellion in its eighteenth-century contexts' in Jim Smyth (ed.), *Revolution, counter-revolution and union: Ireland in the 1790s* (Cambridge, 2000), 1-20: 7-9.
[34] Elliott, *Partners in revolution*, 16, 35, 42, 48-50, 53, 57, 66-7.

to this and her prolific correspondence, her letters are a valuable source for the study of Edgeworth's 'tellograph.'

The optical telegraph, as was the case with the electric telegraph, in a sense did not require inventing. All the components of the optical telegraph were already in place, primarily the telescope and mechanical signalling system. Thus, in order to promote his innovation, Edgeworth faced the challenge of not only marketing the utility of optical telegraphy but also of affirming *his* telegraph as *the* telegraph. This was a period when what a telegraph actual consisted of and would be used for was still in flux. Consequently, the field was open to inventors to shape public perception of the technology and its uses.

To achieve these two goals Edgeworth attempted to demonstrate a priority of invention and a viable use for his tellograph, while also manifesting his credentials as a gentleman of science. The ideal natural philosopher was an independent, Christian gentleman, who would report his observations without bias.[35] Edgeworth's claim to have experimented with optical telegraphy in the 1760s highlighted a priority of invention, and helped his efforts to demonstrate his credentials and authority in the field. This was important, particularly as he did not hold a patent for the tellograph. There are a number of potential reasons for this; in the seventeenth century the 'patentee' was viewed in the same light as the fraudster. Projectors committing much industrial and technical fraud were excluded from polite society. Natural philosophers who had become involved in the plans of projectors were criticised. The patent granted monopolistic rights which could be used to exclude others from profitable use of the technology and in turn impact the reputation of the patentee. Thus, patenting would have conflicted with Edgeworth's efforts to create a persona

[35] For an in depth study of self-fashioning and natural philosophy see Mario Biagioli, *Galileo, courtier: the practice of science in the culture of absolutism* (Chicago & London, 1993), particularly chapter 1, 'Galileo's self-fashioning, 11-102.

of himself as a gentleman, a patriot and a natural philosopher, who was disinterested in personal gain.[36]

Edgeworth was careful to present himself as uninterested in personal advancement or glory. In 1797, he wrote that he did ‘not pretend to say that the means of Tellographic communication which I have invented are the best that can be devised.’ He freely admitted that variations and imitations of his invention were possible, and perhaps even to be welcomed. By focusing on his desire to endorse the art of telegraphy before his own invention he was assuming the persona of a gentlemanly patriot whose motivation was the improvement of national security rather than his own position.[37] In reality, while seeking to present a façade of indifference, Edgeworth assiduously promoted his invention. His powers and will for self-promotion were seen when he undertook to write his memoirs, hoping to use it to secure his ‘posthumous fame’.[38]

In order to promote his invention Edgeworth staged many exhibitions in the mid-1790s, with such displays serving multiple purposes. Firstly, they engaged a broad audience, which potentially included influential nobles, politicians and military figures. Secondly, they afforded Edgeworth an opportunity to prove the practicality of his invention. By the end of the eighteenth century, exhibition had become an important part of legitimising the work of natural philosophers. The use of exhibitions to promote inventions was a tactic employed by many inventors in this period. Edgeworth’s friends James Watt and Josiah Wedgewood had

[36] Larry Stewart, *The rise of public science: rhetoric, technology, and natural philosophy in Newtonian Britain, 1660-1750* (Cambridge, 1992), 29, 260-2, 265-71; Christine McLeod, *Inventing the industrial revolution: the English patent system, 1660-1800* (Cambridge, 1988), 202-4; Christine McLeod, *Heroes of Invention: technology, liberalism and British identity, 1750-1914* (Cambridge, 2007), 8; Stathis Arapostathis and Graeme Gooday, *Patently contestable: electrical technologies and inventor identities on trial in Britain* (Cambridge, Massachusetts & London, 2013), 6-7.
[37] Edgeworth, 'An essay on the art of conveying secret and swift intelligence', in *The Transactions of the Royal Irish Academy, vi* (1797), 95-139: 138;
[38] Public Record Office of Northern Ireland (PRONI) Foster Papers (FP), D207/36/84, R.L. Edgeworth to John Foster, 10 June 1817.

used exhibitions to great effect in promoting their own industrial innovations.[39] These displays played into increased public interest in scientific experiments.[40]

Display also helped to address the debate as to which was more useful the theoretical designs of the natural philosopher or the practical devices of the artisan or mechanic. Mechanics, with a basic understanding of physical laws, were often able to construct useful devices. Consequently, by displaying his invention in operation Edgeworth was able to counter any claims that it was just a theoretical fancy.[41] This is why he rarely mentions tradesmen; the theoretical development of scientific apparatus was viewed as significant not their practical construction.

Edgeworth had many potential audiences who were interested in his new invention. Yet, as Iwan Morus has demonstrated in his work on the later electric telegraph, 'telegraph entrepreneurs and inventors had to work hard to find a market for their product that was prepared to provide capital for its realisation rather than simply to marvel at its ingenuity.'[42] Thus, Edgeworth's efforts to promote his tellograph focussed not only on the design and, as he would argue, the superiority of his technology, but also on its potential uses.

Edgeworth's efforts were aided by several political allies. In August, 1794, he relayed information twelve miles, from the seat of Lord Longford at Pakenham Hall, Co. Westmeath, to Edgeworthstown, Co. Longford. The Bishop of Ossory, William Beresford, who was also

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[39] See Marsden and Smith, *Engineering empires;* Uglow, *The Lunar Men: the Friends who made the Future, 1730-1810*, 210-1; Jenny Uglow, 'Lunar Society of Birmingham (c.1765-c.1800)', in Matthew and Harrison (eds) *Oxford Dictionary of National Biography*; Stewart, *The rise of public science: rhetoric, technology, and natural philosophy in Newtonian Britain, 1660-1750*, 383; for the ongoing friendship between various Lunar Men see, Francis Doherty, 'An eighteenth-century intellectual friendship: letters of Richard Lovell Edgeworth and the Wedgwoods' in *Proceedings of the Royal Irish Academy, Section C: Archaeology, Celtic Studies, History, Linguistics, Literature*, 86c (1986), 231–269.

[40] Margaret C. Jacob and Larry Steward, *Practical matter: Newton's science in the service of industry and empire, 1687-1851* (Cambridge MA & London, 2004), 63-9.

[41] Ibid, 68. 96-102.

[42] Morus, 'The electric Ariel: telegraphy and commercial culture in early Victorian England', 339-78: 342.

present, suggested that he contact the government through an influential third party. With this advice in mind Edgeworth was to approach John Foster, speaker of the House of Commons.[43]

Foster, a lifelong friend of Edgeworth, would become an important ally in his efforts to promote his invention. Like Edgeworth, he was interested in learning and improvement and, according to his biographer, was a member of the Irish 'Enlightenment'. Both were members of the Royal Irish Academy (RIA), Foster having been elected in May 1785. Foster had been elected speaker of the Irish House of Commons in 1785, and had been in the inner circle of the Irish administration since 1777.[44] He was particularly active in the Royal Dublin Society (RDS), which was formed in 1731 'for improving husbandry, manufacture and other useful arts.' While he could be contemptuous of RDS members who focused too greatly on abstract scientific theories, he was quite interested in the practical application of 'theory and science to the everyday management of Irish farms.'[45]

In November, 1794, Edgeworth displayed his tellograph for Foster at Collon, Co. Louth.[46] The same month two further exhibitions were undertaken which demonstrated the invention's utility. Perhaps the most spectacular of these displays was when, using thirty-feet-high tellographs, Lovell Edgeworth communicated between Donaghadee, Ireland, and Port Patrick, Scotland. This was significant for two reasons, firstly it demonstrated the distances that the technology could operate over, and secondly, and perhaps most importantly in light of rival British inventors, that his system would allow tellographic communication between the two islands.[47] This was followed by a further display which connected Collon to Dublin.[48]

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[43] Wilson, *The old telegraphs*, 104; Clarke, *The ingenious Mr Edgeworth*, 140.
[44] A.P.W. Malcomson, *John Foster (1740-1828): the politics of improvement and prosperity* (Dublin, 2011), 15-21, 90; A. P. W. Malcomson, 'Foster, John Baron Oriel', in McGuire and Quinn (eds), *Dictionary of Irish Biography*.
[45] Malcomson, *John Foster (1740-1828): the politics of improvement and prosperity*, 373-4, 377-8, 380, 388-93; A.P.W. Malcomson, *John Foster: the politics of the Anglo-Irish Ascendancy* (Oxford, 1978), 198; for an insight into their correspondence see PRONI (FP) D207/36, *c.* 100 letters between members of the Edgeworth family and Foster.
[46] Wilson, *The telegraphs,* 104; Clarke, *The ingenious Mr Edgeworth*, p. 140.
[47] Edgeworth, 'An essay on the art of conveying secret and swift intelligence', 138.
[48] Clarke, *The ingenious Mr Edgeworth*, p. 140.

Edgeworth was to draft a memorial to the new lord lieutenant, Earl Camden. Foster's support could prove invaluable, not only was he well connected in learnt and political spheres but he was also on good terms with Camden. Edgeworth obviously valued Foster's opinion and a number of drafts of later memorials concerning his tellograph are present in Foster's papers.[49] In his memorial, Edgeworth was careful to identify numerous uses for his tellograph. While in the first instance it would be a military tool, he also envisaged it having a role

> in promoting the exchange of commodities, in facilitating the exchange of commodities, in facilitating the business of insurance, in preventing frauds in lotteries, in equalising the price of grain, and of other merchandize, and in short they may be felt in every intercourse of society.[50]

While unsuccessful in securing Camden's backing, Edgeworth's efforts demonstrate the importance of political support when attempting to attract government sponsorship for technological development in late eighteenth-century Ireland. The emphasis on the range of potential uses for the tellograph also highlights his attempts to create the perception of uses for his innovation. However, despite the range of potential uses the military remained the focus of Edgeworth's efforts, as there was little hope of securing the necessary funding from private sources.[51]

Edgeworth's daughter, Maria, felt that the use of an alternative name, the 'logograph' (as he originally called his invention), was an attempt to emphasise its difference to the French telegraph.[52] Chappe had named his telegraph the *télégraphe*, deriving the name from the Greek *tele*, afar, far off, and *graph*, that writes, delineates, or describes, thus a *télégraphe*

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[49] PRONI (FP) D207/36/25 & D207/36/26, Proposal of Richard Lovell Edgeworth, 1796, and Proposal by Richard Lovell Edgeworth [n.d. by probably 1796].
[50] Richard Edgeworth, 'A proposal addressed to his excellency the lord lieutenant of Ireland, for the establishment of a corps of men, to convey secret and swift intelligence, 14 September 1794', in Richard Edgeworth, *A letter to the right hon. the Earl of Charlemont, on the tellograph and on the defence of Ireland* (Dublin, 1797), 7-8.
[51] Edgeworth, *Memoirs of Richard Lovell Edgeworth, Esq.* Vol. 2, 160.
[52] NLI, Edgeworth Papers (EP) MS 10,166/7, 125, Maria Edgeworth to Mrs. Ruxton, 11 April 1795.

wrote at a distance. Edgeworth stated that while the French telegraph transmitted letters at a distance his logograph transmitted words, thus the use of *logo* (words). Logograph was chosen ‘because of its allusions to the Logographic printing presses which print words instead of letters’. In his 1794 memorial to the Camden, Edgeworth carefully avoided the word ‘telegraph’ in order to evade any association with the French system ‘and preserve the idea of originality for the invention’.[53]

In 1795 Edgeworth changed the name of his device to ‘tellograph’, demonstrating that like the increasingly well-known Chappe telegraph it transmitted over distances while indicting its uniqueness in allowing the transmission of words hence the retention of *logo*. Edgeworth felt that while *‘telegraph* is a proper name for a machine which describes at a distance. *Telelograph*, or contractedly *tellograph*, is a proper name for a machine that describes *words* at a distance.’[54] Edgeworth, while attempting to promote the art of optical telegraphy, was also aware that ‘national pride dislike [s] the sound of <u>the French Telegraph</u>’.[55] In differentiating the two devices he was promoting his tellograph as a *British* telegraph as much as an *Edgeworth* telegraph.

While Edgeworth sought to use political influence to gain the patronage needed to implement his telegraphic system, he was simultaneously engaged with another sphere of influence: scientific authority. While considered separately here, it must be remember that there was a significant overlap between scientific and political spheres in late eighteenth-century Ireland. Edgeworth gave a presentation on his tellograph at the Royal Irish Academy (RIA) on 27 June 1795, which was printed as 'An essay on the art of conveying secret and swift intelligence' in the Academy’s *Transactions*, 1797. Much of our information on Edgeworth’s tellograph is based on this article. It provides a broad over-view of efforts to

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[53] NLI, EP, MS 10, 166/7, 108, Maria Edgeworth to Sophy Ruxton, 23 Feb. 1794.
[54] Edgeworth, 'An essay on the art of conveying secret and swift intelligence', 126 [emphasises in the original].
[55] NLI, EP, MS 10, 166/7, 108, Maria Edgeworth to Sophy Ruxton, 23 Feb. 1794 [emphasis in the original].

expedient communication over long distances; Edgeworth's own early efforts in the 1860s are discussed, before his engagement with his contemporary experiments.[56]

The RIA, modelled on the Royal Society of London, was established in 1785 to 'promote the study of science, polite literature and antiquities'. It received a royal charter the following year and would develop into one of the main bodies for the gentlemanly and scholarly study of science in Ireland. The academy's approval would have brought Edgeworth's telegraph much prestige. [57] Indeed such institutions were as much 'lobbies for influence' as they were centres of scientific learning and membership implied a level of technical and scientific competence.[58] The publication of his presentation in the society's *Transactions* furthered Edgeworth's attempts to define a role for optical telegraphy. In addition, the society's membership was made up of the elite of Irish society. For example, James Caulfeild, First Earl of Charlemont, was the society's first president and was a supporter of Edgeworth's telegraph from at least 1794. He and the other members of the RIA were useful allies in Edgeworth's efforts to promote his invention.[59]

The discussion of innovations such as Edgeworth's telegraph at RIA meetings is not surprising given the Academy's aim not only to study science but also to prove such studies useful to the economy of the country.[60] In his paper Edgeworth highlighted that his invention would enable the speedy deployment of the military upon any invading or native belligerents. He again emphasised the multiple uses to which his tellograph could be put, including the transmission of commercial information. In meteorological forecasting the connection of the

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[56] Edgeworth, 'An essay on the art of conveying secret and swift intelligence'.
[57] R.B. McDowell, 'The main narrative: before 1800', in T.Ó. Raifeartaigh, *The Royal Irish Academy: a bicentennial history, 1795-1985* (Dublin, 1985), 8-11; Jacob and Stewart, *Practical matter: Newton's science in the service of industry and empire, 1687*-1851, 37-41.
[58] Simon Schaffer, 'A presiding influence': the relations of the 3rd Earl of Rosse with scientific institutions in Britain and Ireland' in Charles Mollan (ed.), *William Parsons, 3rd Earl of Rosse: Astronomy and the castle in nineteenth-century Ireland* (Manchester and New York, 2014), 315-316; Jacob and Stewart, *Practical matter: Newton's science in the service of industry and empire, 1687*-1851, 38.
[59] McDowell, 'The main narrative: before 1800', 9; NLI, EP, MS 10, 166/7, 108, Maria Edgeworth to Sophy Ruxton, 14 July 1790.
[60] McDowell, 'The main narrative: before 1800', 13.

major ports of Ireland and Britain would assist in furthering knowledge of this science.[61] Thus, in his presentation to the RIA Edgeworth stated that his telegraph would not only help combat immediate security problems but also aid the economy and assist in scientific pursuits, such as meteorology. This was exactly the potential that the founders of the RIA aspired to in the application of science.

At the RIA Edgeworth outlined that his communication system, consisting of telegraph stations positioned up to twenty-miles apart, would relay four-digit codes. Each station would consist of four tellographs mounted on solid wooded or stone pillars, sixteen to twenty-feet high, on top of which would be placed triangular pointers. These would be made of timber frames with canvas covers and could be rotated to signal in any direction (fig. 3). The triangular pointers would relay the digits zero to seven, by pointing horizontally, vertically and diagonally, in clockwise rotation, beginning with zero at the top (fig. 4). Each tellograph would denote a single digit of the four digit code. These fixed telegraph stations could also be fortified against 'mob or musketry', signifying that they were designed to combat the dual threat of Irish rebellion or French invasion. They would require one man at each tower, a further one using a telescope and another using the telegraphic vocabulary to decipher the codes.[62]

The telegraphic system would also incorporate mobile telegraphic apparatus (fig. 5). These would consist of ten-to-twelve-feet long pointers placed on triangular stands, which would be attached to the ground using rope and tent pegs (fig. 6). The smallest of these, at six foot, could be erected by one man. While portable telegraphs would have a smaller range than those of a fixed nature, they did offer many advantages. They could be placed outside the line of communication between the fixed stations, temporarily connecting areas to the larger

[61] Edgeworth, 'An essay on the art of conveying secret and swift intelligence', 110-118.
[62] Ibid, 129, 132.

tellograph network. This could be quite valuable to an army corps in relaying information and receiving instructions. In bad weather, which might disable communication between the fixed tellograph towers, they would act as intermediary stations. They could also remove the need to maintain costly fixed stations, allowing for the training of a telegraphic corps which could be used in times of crisis. Edgeworth also envisaged a 'nocturnal telegraph' but nothing more is known about it. [63]

Edgeworth was not just proposing a communication apparatus but a communication system, with a detailed operational framework. Like latter day technological system builders, he faced problems integrating the various components, technological and human.[64] He would rely heavily on his telegraphic corps, setting out strict operational guidelines. Dublin was to initiate communication at fixed times each day. If it had no intelligence it would relay to the rest of the country to begin transmitting. At this point the outer arms at each station were to 'whirl' continuously in a circle until the answering station did the same. The sending station could then commence signalling. The receiving station would turn its arm for hundreds to the number two position and it would remain there until the word was retrieved from the telegraph vocabulary, at which point the arm would be moved to zero. On this signal the sending station would move all its arms to zero, confirming that the word was sent and received. Once communication was completed the sending station's outer arms would be directed downward and swung like a pendulum until the receiving station did likewise; however, if there was an interruption these arms would point upward and 'vibrate'.[65] This meticulous operation could be frustrating but there was a pressing need for a firm set of

[63] NLI, MS 8182, folder 1, Edgeworth to Littlehales, 12 Oct. 1803; Edgeworth, 'An essay on the art of conveying secret and swift intelligence', 129, 132-133, 137.
[64] For examples of the challenges of building such systems see Thomas Hughes, *Networks of power: Electrification in western society, 1880-1930* (Baltimore, 1983).
[65] Edgeworth, 'An essay on the art of conveying secret and swift intelligence', 130-131.

instructions with which to regulate the telegraphic system. Edgeworth's tellograph, while speedy, relied upon a faithful relaying of information along the telegraphic line.[66]

The nature of the work meant that there was no room for error or perfunctoriness and Edgeworth realised the importance of reliable men. For this reason the pay of a private in the telegraphic corps was '½ d more than that of any Sergeant in the line'.[67] However, this rate of pay was justified by the competence of the men who operated the telegraphs, the isolated nature of the work and the requirement that they should be literate. While the Chappe telegraph was the most prominent optical telegraph used in Europe, there is no evidence that Edgeworth modelled the duties and training of his corps on it. Secrecy was also of the upmost importance and, as highlighted by the epigraph to this paper, the Telegraphic Corps would be bound by oath to ensure this.

The other component of the telegraph system was the telegraphic vocabulary, used to translate the relayed four-digit codes. Edgeworth argued that, unlike the French telegraph, his could not be read unless one possessed a vocabulary and a simple change of the numeration would make any vocabulary obtained by the enemy obsolete.[68] However, in practise the Chappe system used its signals not to transmit letters but rather codes for pre-arranged ciphers.[69]

The design of the tellograph limited the number of signals that it could transmit to eight. This limitation need not have been a hindrance; the Morse telegraph had only two signals—dots and dashes. It did however present Edgeworth with the choice to either design a code that would transmit individual letters and digits or set messages based on a sequence of signals (in this case the numbers zero to seven, representing the seven points on the

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[66] Richard Lovell Edgeworth, 'Supplement to Mr Edgeworth's essay upon the telegraph', *The Transactions of the Royal Irish Academy,* 6 (1797), 313-7: 315.
[67] NLI, MS 8182, folder 9, Francis Beaufort to Fanny [?], 29 Mar. 1804.
[68] Edgeworth, 'An essay on the art of conveying secret and swift intelligence', 136-137.
[69] Beauchamp, *The history of telegraphy*, 6.

tellograph). Edgeworth designed his vocabulary on the latter principle, using four-digit codes that would be translated using a vocabulary. Despite promoting a vocabulary that was concerned with military matters, Edgeworth envisaged multiple vocabularies that could be used for transmitting various types of intelligence.[70]

The military vocabulary contained entries up to 7357, excluding the numbers eight and nine, which could not be transmitted, covering a range of messages—there were also codes for each letter if a word had to be spelled out. The vocabulary highlights Edgeworth's efforts to attract military patronage for his invention. Examples of these messages include:

> 7275, Can the yeomanry be ready to march at an hours' notice; 7276, is the ford on the Shannon passable at; 7277, what is the disposition of the peasantry; 7311, what is the rebel force; 7312, who is their general; 7313, has the mail coach arrived safe from; 7347, a number of pikes at; 7352, the ring leaders are apprehended; 7353, a fire has broken out at; 7354, a ship is lost; 7355, the French have taken; 7356, there is a smoke over the town of.[71]

As can be seen from these extracts the tellograph was at this point marketed as a tool to address a perceived threat from not just the French but also the local population.

Edgeworth was to continue to promote his invention as a means of protecting Ireland from French invasion and indigenous rebellion. From the summer of 1796 such an invasion had become increasingly likely and plans for landing French forces in Ireland, Wales and the south of England were well known. Dublin Castle was also aware of the threat emanating from the pro-French United Irishmen and Defenders, particularly in Ulster, and on 6 November 1796 the counties Antrim, Down, Tyrone, Derry and Armagh were placed under the Insurrection Act. Of definite concern to the authorities was the capture of the *Olive Branch* with 20,000 stand of arms and an entire field-train of artillery en-route to Ireland

[70] Edgeworth, *A letter to the right hon. the Earl of Charlemont, on the tellograph and on the defence of Ireland* (Dublin, 1797), 19.
[71] NLI, MS 7393, Telegraph code by R. L. Edgeworth, with the heading, vocabulary complete, late 18th cent.

from France, the ship had already made several journeys between the two countries. These events ratcheted fears of a rebellion and tensions were high.[72]

In January 1796, in a letter to a Mr O'Byrne[73], Edgeworth wrote of his frustration at the lack of defensive preparations in Ireland. To this end he offered to contribute £500 to the construction of a tellograph network to protect the island from 'foreign invasion or domestic insurrection.'[74] Edgeworth was to demonstrate his tellograph to Earl Camden, on 3 October 1796. His immediate focus was the potential construction of a Dublin to Cork optical tellograph line, Cork being perceived as a likely French landing site. He also hoped for the eventual development of a nationwide system, which he estimated would cost £6,000 or £7,000 (fig. 7).[75] This would consist of approximately thirty permanent stations supported by portable apparatus. He estimated that each permanent station would cost around £300 but the substitution of these with portable telegraphs would half the cost. Nevertheless, the expense of such an undertaking was still considerable given that it would be a new and sustained drain on the exchequer.[76]

Responding to Edgeworth's advances Thomas Pelham, later Lord Chichester, then chief secretary of Ireland, outlined that the lord lieutenant had sought advice as to advantages of such a system but the Admiralty was not inclined to back the proposals. While the lord lieutenant was impressed with the invention, he could not at that point 'see any purpose in this country for which he could be warranted in incurring the expense'. Therefore, while the 'utility of a telegraph may hereafter be considered greater' it was not to be implemented at

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72 Elliott, *Partners in revolution: the United Irishmen and France*, 57, 67, 92-4, 106, 108.
73 There are no further details of who this gentleman is.
74 NLI, EP, MS 10, 166/7, 142, R.L. Edgeworth to Mr O'Byrne, in Maria Edgeworth to Mrs Ruxton, 26 Jan. 1796.
75 Edgeworth to Mr Pelham, memorial, 6 Oct. 1796, quoted in Edgeworth, *Memoirs of Richard Lovell Edgeworth, Esq.* vol 2, 162.
76 Edgeworth, *A letter to the right hon. the Earl of Charlemont*, 9.

this juncture.[77] Hence, the rationale against implementing the technology was not its practicality but rather its cost.

Alongside his efforts to convince the Irish administration of the tellograph's merits, Edgeworth's son Lovell demonstrated the invention to the Duke of York, at Kensington Gardens, in October 1796.[78] The duke, who as already outlined was interested in developing a field telegraph for the army, seemed quite impressed and talked of using the admiralty telegraph as far as Port Patrick, Scotland, and then Edgeworth's system in Ireland;[79] however, nothing came of this approach.[80]

Following these exhibitions Edgeworth composed a supplement to his RIA essay, dated 3 December 1796. Interestingly, Edgeworth refers to his apparatus as the telegraph throughout. He had made a number of modifications to his invention, including improved supports for stormy weather. He also had decided, in what was likely a cost-saving exercise, to use one machine at each station rather than four.[81]

French landings and Irish rebellion

In December of 1796, in response to lobbying by the United Irishmen, a French invasion force of approximately 14,000 troops, under the command of General Hoche, left Brest. The fleet also carried 41,644 stands of arms to arm domestic insurgents. The bulk of the force arrived off Bantry Bay, Co. Cork, on 22 December, but did not disembark due to unfavourable weather.[82]

The failure of the British navy to intercept the French alerted loyalists in Ireland that they could not rely on it to protect them. Military surveys reveal that there were only around

[77] Historical Manuscripts Commission (HMC) *The manuscripts and correspondence of James, first earl of Charlemont,* Copy of Mr Pelham's letter to Mr Edgeworth, 17 Nov. 1796 (2 vols, London, 18), vol. 2, 288.
[78] Edgeworth, 'Supplement to Mr Edgeworth's essay upon the telegraph', 316.
[79] NLI, EP, MS 10, 166/7, Lovell Edgeworth to Richard Lovell Edgeworth, 29 Oct. 1796, copy by C. Sneyd.
[80] Edgeworth, *Memoirs of Richard Lovell Edgeworth, Esq.* vol. 2, 165.
[81] Edgeworth, 'Supplement to Mr Edgeworth's essay upon the telegraph', 313-7.
[82] Elliott, *Partners in revolution: the United Irishmen and France*, 111-3; Marianne Elliott, *Wolfe Tone: prophet of Irish independence* (New Haven & London, 1989), p. 328.

6,000 troops available to meet an invading force at the coast and that it would take up to five days to assemble such a force at the landing site. It was realised that improvements were needed in Ireland's defence and proposals included the creation of a moveable force for rapid deployment against any enemy. In this context the ability of Edgeworth's telegraph to concentrate forces rapidly was an important marketing point for the technology.[83] Edgeworth, referring to Bantry Bay, stated that 'we escaped absolute conquest but narrowly and … I see no reason why the French may not return'.[84] He was to press the government, most publicly in his pamphlet *A letter to the right hon. the Earl of Charlemont, on the tellograph and on the defence of Ireland* (Dublin, 1797). This pamphlet gives an account of Edgeworth's efforts to promote his invention and in doing so emphasises how the art of telegraphy could be used for the relaying of information and deployment of troops in case of invasion.[85]

In 1798, Ireland was convulsed by the United Irishman rebellion. In support of the uprising the French landed a force of approximately 1,000 troops, under General Humbert, in county Mayo in August; Edgeworth sent a letter to Lord Cornwallis offering the services of his telegraph but to no avail.[86] With the signing of the peace of Amiens, 27 March 1802, the immediate threat to Ireland receded. However, with the renewal of hostilities in 1803, and naval preparations in France's western ports, the threat of invasion was to return. In addition, remnants of the United Irishmen also planned to rise against British rule, plans which came to fruition as the attempted Emmet rising on the night of 23 July 1803. Despite the rising being a disaster for the rebels, the secrecy with which it was planned led to a wave of loyalist

[83] Elliott, *Partners in revolution: the United Irishmen and France,* 121; Elliott, *Wolfe Tone: prophet of Irish independence,* 328-9.
[84] NLI, EP, MS 10, 166/7, R.L. Edgeworth to Mrs Mary [?], 20 Feb. 1797.
[85] Edgeworth, *A letter to the right hon. the Earl of Charlemont, on the tellograph and on the defence of Ireland.*
[86] NLI, EP, MS 10, 166/7, Maria Edgeworth to Sophy Ruxton, 29 Aug. 1798; Elliott, *Partners in revolution: the United Irishmen and France,* 222-7.

hysteria. The administration simply did not know the extent of the threat which it faced and a potential French invasion seemed very real.[87]

Ireland's defences were in a precarious condition. While the rapid brigade system, designed to engage an enemy invasion, had been maintained, significant reductions in the army had taken place following the suppression of the 1798 rebellion. This meant that it was essential for the army to avoid engagement before the intentions of the French were known. Such a situation only exacerbated the need for rapid communication. In light of this new security situation the government was to engage hastily in the construction of defences and the improvement of communication. It was in this climate of heightened military threat and poor preparations that the state was willing to invest in new technologies.[88] It embarked upon a number of projects, ranging from the employment of gunships and Martello towers at strategic points along the coast, to defensive fortifications along the Shannon.[89]

Long-distance visual communication was also an option that the government considered. Indeed 'telegraphic fires' were used in July 1803 to alert the province of Munster to the failure of the Emmet rising in July.[90] These fires were, however, a source of great concern, for it was not the authorities who were in possession of superior communications but the rebels. General Tarleton, during a parliamentary debate on the matter in 1804, voiced his belief that the rebels in Munster, by using telegraphic fires, were able to learn of the defeat of the Dublin rebellion before the 'King's officers in Cork'.[91]

In 1803, in light of the renewed threat of rebellion and a possible invasion, Edgeworth demonstrated his tellograph for the Earl of Hardwicke, the lord lieutenant. This involved a

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[87] McDowell, 'The Protestant Nation', 247; Elliott, *Partners in revolution: the United Irishmen and France,* 316-20, 324.
[88] Elliott, *Partners in revolution: the United Irishmen and France,* 334.
[89] National Archives, Kew, (NA), HO 100/111,Hardwicke to Charles Yorke, [ND]; J.H. McEnery, *Fortress Ireland: the story of the Irish coastal forts and the River Shannon defence line* (Wicklow, 2006), 65-72, 89-116.
[90] *Hansard 1,* i, 735-806 (7 Mar. 1804).
[91] *Hansard 1,* i, 735-806 (7 Mar. 1804).

telegraphic link between Castleknock, Co. Dublin, and Carton—the seat of the Duke of Leinster—Co. Kildare, a distance of over twelve miles. Hardwicke was impressed by the demonstration and requested that Edgeworth construct a pilot telegraph line, from Dublin to Galway, in preparation for a national network.[92] This enterprise was designated the 'Telegraphic Establishment'; importantly, given that it was a pilot line, it was to use *portable* tellographs. Maria Edgeworth only hoped that God would 'keep Bonaparte away till the Giant Isosceles is ready on the coast to meet him.'[93]

Edgeworth envisaged a network of watches on all the main coastal vantage points which would use fires to alert a national optical telegraph network.[94] This network would connect Dublin, to Cork via Waterford; to Galway via Athlone; to Westport and Donegal town via Sligo; and to Dundalk with two branches from here, one leading to Letterkenny and one to Belfast, allowing for communication between Ireland to Britain[95] (fig. 7). Edgeworth estimated that the eighty-five station national telegraph system would cost up £8,000, as this was solely for use by the military it would be completely funded by the state.[96] His proposed system would only be used during times of possible French invasion. He estimated that the corps would train two days per week and would be on permanent duty only twenty days per year.[97]

The government decided to construct two separate optical communication networks. The first was a line of coastal semaphore towers—similar to those in operation along the southern coast of Britain which used a system of flags and balls. It would alert the government of French naval movements and landings. In little under a year the system was operational along the south-west coast, by 3 July 1804 the construction and manning of the

[92] NLI, MS 8182, folder 5, E.B. Littlehales to Edgeworth, 3 Nov. 1803.
[93] NLI, EP, MS 10, 166/7, Maria Edgeworth to Sophy Ruxton, 16 Dec. 1803.
[94] NLI, MS 8182, folder 1, Edgeworth to Littlehales, 12 Oct.1803.
[95] Edgeworth, 'An essay on the art of conveying secret and swift intelligence', 138.
[96] NLI, MS 8182, folder 10, Edgeworth to Littlehales, 30 Dec. 1804.
[97] National Archives of Ireland (NAI), OP/174/18, R.L. Edgeworth to [?], 13 Oct. 1803.

signal stations and defensive guard-towers had cost £40,000. While the British system had not included defensive towers, they were needed in Ireland to protect the signalling crew from 'internal enemies'.[98] Thus, Edgeworth's pilot tellograph line rather than being adopted as a warning system for French naval movements was instead commissioned as a field telegraph allowing for rapid internal communication. Importantly, the route of the pilot line would allow for a station to be established at Athlone, which was to act as a rallying point and bulwark against any French landing in Connaught. It would 'be applicable to many objects of internal police, as well as that most important one of military communication' and Hardwicke felt that 'there can be doubt of the advantage that it will produce'.[99]

The pilot line consisting of portable tellographs, with temporary guard houses and a telegraphic corps raised from the Edgeworthstown yeomanry,[100] commenced at the Royal Hospital, Kilmainham; it then went to Castleknock; then to Carton, the seat of the Duke of Leinster.[101] The next station at the Hill of Cappagh, near Kilcock, was fortified using the ruins of a windmill as an experiment.[102] There were a further eleven stations in the line, including Athlone and Galway.[103]

By December 1803 the telegraphic vocabulary was nearly completed and dedicated with the words 'by arms and science Hardwicke guards a throne and with a nation's glory blends his own.'[104] With this dedication Edgeworth was demonstrating his belief that the new science was an intricate part of national security, and that science was a practical matter as much as a theoretical one. Indeed, this association between the practical application of

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[98] P.C. Stoddart, 'Counter-insurgency and defence in Ireland, 1790-1805' unpublished PhD thesis, University of Oxford, 1972, 375, 378-80; NA, HO 100/121, f. 7, Memoranda, 3 July 1804; NA, HO 100/121, f. 121, Hardwicke to Hawksbury, 28 Sept. 1804; P. M. Kerrigan, *Castles and fortifications, 1485-1945* (Cork, 1995), 156-157.
[99] Hardwicke to Hawksbury, 7 June 1804 (NA, HO 100/120, f. 47).
[100] Edgeworth, *Memoirs of Richard Lovell Edgeworth, Esq.,* ii, 297-298.
[101] NLI, EP, MS 10, 166/7, Richard Lovell Edgeworth to Maria Edgeworth, in Maria Edgeworth to Sophy Ruxton, Nov. 1803.
[102] Edgeworth, *Memoirs of Richard Lovell Edgeworth, Esq.,* ii, 298-299.
[103] *Freeman's Journal,* 7 July 1804.
[104] *Freeman's Journal,* 7 July 1804.

science and national defence was a central factor in Edgeworth's success. On 14 January 1804 Edgeworth was able to claim that 'after various attempts we have at length succeeded in completing a chain of stations from Dublin to Galway.'[105] In the same month there was also a request from the government to build defensive towers at fifteen stations.[106]

By March of 1804 the telegraphic system was operational from Dublin to Athlone.[107] Problems were still being experienced in June; according to Francis Beaufort[108] 'at 10 minutes past 9 this morning arrived the whirl—the harbingers of success and joy I fondly thought', but the operators could not 'make head or tail' of the codes received.[109] These problems were resolved and on 22 July Maria Edgeworth wrote that her father had gone 'to open the air canal from Dublin to Galway' before the lord lieutenant.[110]

Edgeworth's memoirs claim that telegraphic communication between Dublin and Galway was carried out in eight minutes.[111] This rapid speed is supported by an article in the *Freeman's Journal*, 7 July 1804, which states that a telegraph message of 'considerable length' was sent to Galway from Dublin in thirty-five minutes and a return message was received in less than five minutes. It therefore took forty minutes to send and receive a message from Dublin to Galway. This article also states that 'forty-four signals have actually been sent and received in thirty-nine minutes.' This swiftness of transmission represented a revolution in communication.[112]

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105 NLI, MS 8182, folder 2, Edgeworth to Littlehales, 14 Jan. 1804.
106 NLI, MS 8182, folder 4, Edgeworth to Littlehales, Aug. 1804.
107 NLI, EP, MS 10, 166/7, Charlotte Edgeworth to Emmeline King, 13 Mar. 1804.
108 Beaufort, Edgeworth's brother-in-law, was to be his chief aide in the construction of the Tellograph line. He would go on to become a rear-admiral, hydrographer to the Royal Navy, FRS, MRIA, fellow of the Royal Astronomical Society and honorary fellow of the Geological Society of London; he is probably best known as the creator of the Beaufort scale.
109 NLI, MS 8182, folder 9, Francis Beaufort to Edgeworth, 25 June 1804
110 NLI, MS 8182, folder 9, Anon to Edgeworth, 4 July. 1804; EP, MS 10, 166/7, Maria Edgeworth to Sophy Ruxton, 22 July 1804.
111 Edgeworth, *Memoirs of Richard Lovell Edgeworth, Esq.,* ii, 298.
112 *Freeman's Journal,* 7 July 1804.

In his efforts to promote his invention Edgeworth was careful to emphasise that he was motivated purely by a desire to aid his country. His proclamations were so convincing that in June 1804 the lord lieutenant informed Edgeworth that a Colonel Robinson would replace him as commander of the Telegraph corps once the pilot line was completed. Edgeworth was quick to respond claiming that he had always intended to seek a position, such as superintendent of telegraphs, and to claim remuneration for such a role.[113] This came as a shock to E.B. Littlehales who suggested that Hardwicke attempt to settle the dispute. [114] Edgeworth was eventually appointed superintendent with a salary of £300 per annum, with Hardwicke noting that Edgeworth had undertaken the execution of the line 'from public spirit'.[115]

In October 1804 Hardwicke was reminded by Lord Hawkesbury, Home Secretary, that due to the 'lateness of the season and the backward state of many of the works,' on both signalling systems, it might be advisable to 'forgo the erection of such as may be considered as least important'. This would ensure the completion of the most important stations before winter set in.[116] Hardwicke replied that in consequence of these suggestions they would concentrate on the completion of stations 'of more consequence before winter sets in'. Both Hawkesbury and Hardwicke were also concerned with expenditure and Hardwicke did not want to incur 'an expense without a certainty of adequate advantage.'[117]

Despite the Telegraphic Establishment's successful operation, problems forming a unit to operate it were ongoing. Edgeworth had organised a corps from the Edgeworthstown Yeomanry but plans were also put forward to use invalids.[118] These difficulties were to

[113] British Library (BL), MS 35768, f. 176, R.L. Edgeworth to Lord Hardwicke, 4 July 1804.
[114] BL, MS 35768, f. 168, E.B. Littlehales to Lord Hardwicke, 23 June 1804.
[115] NA, HO 100/121, f. 121, Hardwicke to Hawksbury, 28 September 1804.
[116] Ibid, f. 181, Hawkesbury to Hardwicke, 23 Oct. 1804.
[117] Ibid, f. 251, Hardwicke to Hawkesbury, 26 November 1804.
[118] NAI, OP/174/18, Record of letter from R.L. Edgeworth, 22 March 1804.

continue to December 1804.[119] At this point the telegraph line between Dublin and Galway had been suspended,[120] a decision was made to restrict expenditure and concentrate on the completion of the coastal signalling stations.[121]

In addition to the construction of signalling stations, work had also begun on a network of Martello towers at strategic locations around the Irish coast. Other significant defence works, including those on the river Shannon, would act as a bulwark to contain a foreign landing on the west coast. Edgeworth reasoned that the improved fortifications would no doubt lead to a change in French invasion plans and, in a letter to Littlehales on the 30 December, he pushed for a nation-wide telegraph network to meet this challenge.[122] At this point the Establishment's suspension did not appear permanent and Edgeworth was still sending maps and letters relating to a proposed nation-wide telegraph network.[123] Littlehales, was definitely under the impression that the service was to be retained. He wrote to Hardwicke in January 1805 seeking clarity on the rates of pay for the corps and other queries from Edgeworth, while Maria Edgeworth stated in March 1805 that the government intended to continue with the establishment.[124]

In August 1804, Russia, Austria and England formed the third coalition against France, reducing the availability of French troops for an Irish invasion. France's ability to invade was further restricted when, on 21 October 1805, the Franco-Spanish fleet was destroyed at Trafalgar.[125] Thus, the diminishing threat of French invasion combined with

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[119] Stoddart, 'Counter-insurgency and defence in Ireland', 378.
[120] NLI, MS. 8182, R.L. Edgeworth to E.B. Littlehales, 30 Dec. 1804.
[121] NA, HO 100/121, f. 251, Hardwicke to Hawkesbury, 26 Nov. 1804.
[122] NLI, MS 8182, R.L. Edgeworth to E.B. Littlehales, 30 Dec. 1804; BL, MS 35755, f. 88, R.L. Edgeworth to Anon [probably E.B. Littlehales], 30 Dec. 1804.
[123]BL, MS 35755, f. 82, R.L. Edgeworth to E.B. Littlehales, 30 Dec. 1804, ibid, f. 88, R.L. Edgeworth to [?] [probably E.B. Littlehales], 30 Dec. 1804.
[124] Ibid, f. 77, E.B. Littlehales to Lord Hardwicke, 8 Jan. 1805; NLI, EP, MS 10,166/7, Maria Edgeworth to Mrs Ruxton, 21 Mar. 1805.
[125] James Kelly, "'Disappointing the boundless ambition of France": Irish protestants and the fear of invasion, 1661-1815' in *Studia Hibernica,* 37 (2011), 27-105: 101; Elliott, *Partners in revolution: the United Irishmen and France,* 339-40.

improved fortifications in Ireland meant that the expense of the ‘Telegraphic Establishment’ again outweighed the perceived benefits. It would not become operational again—by 1809 even the coastal signalling towers were abandoned.

Conclusion

It is unlikely that optical telegraphy, as it developed during the eighteenth century, was viewed as anything other than an amusing, albeit expensive, curiosity. Hence, the implementation of the technology in a number of countries in the 1790s and 1800s provides valuable insights into how broader factors, in this case the events surrounding the French revolution, influence the success or failure of technologies. In France a centralising regime made use of the telegraph to transmit administrative and military intelligence, and the perceived benefits were deemed to outweigh its high cost. In Britain—at war with France from 1803—conservativism toward technological innovation was also overcome. However, since the Royal Navy formed the mainstay of Britain’s defences, the widespread adoption of telegraphy for government and military use, as in France, was not to happen.

In Ireland, R.L. Edgeworth aware of the opportunity provided by the heightened military and political tensions began to promote his own optical telegraph. By focusing on a military use he sought to secure government support to construct a national telegraph network. Edgeworth faced many competitors and so it was important for him to promote *his* telegraph as *the* telegraph. In order to do this, he engaged in a series of exhibitions which proved its effectiveness and efficiently. He attempted to build up the political, scientific and civic capital required to influence the government by making presentations to the RIA. Such institutions were powerful sites of influence and by using their authority Edgeworth was able to fashion himself as an impartial party whose interest in the implementation of optical telegraphy was driven by purely scientific and patriotic motives. While successful in his efforts to promote *his* telegraph, gaining recognition from the lord lieutenant of its reliability, its implementation remained elusive. The central reason was that the perceived threat of French invasion was not deemed great enough to warrant the expenditure needed for its construction and operation.

However, following multiple, real and attempted, French landings and Irish rebellions, the government was alert to the dangers it faced when the Peace of Amiens collapsed in 1803. With the island's defences in disarray the high cost of Edgeworth's tellograph had become acceptable. Thus, in the context of a threatened French invasion and fear of indigenous rebellion the tellograph was a successful technology. The fact that Edgeworth's tellograph was adopted is testament more to the efforts he made to promote *his* telegraph than any inherent superiority in design. Its implementation demonstrates that Edgeworth had successfully constructed a market for his tellograph.

Despite the initial success of the Edgeworth tellograph and the establishment of a pilot line, it was ultimately a failed technology. The initial suspension of the telegraph establishment at the end of 1804 was due to delays in manning the stations and a reluctance to expend money, understandable given the heavy burden on the exchequer due to the war. Conversely, the suspension appeared to be temporary. However, it was never to operate again; the reducing threat of French invasion; the improvement of defensive fortifications, particularly along the river Shannon, and the continued reluctance to burden the strained exchequer were decisive. The failure of Edgeworth's tellograph was not in any inherent design fault but rather in its inventor's inability to construct and sustain the perception of a market for it.

As this case study has demonstrated technological development and implementation is not purely a matter of engineering. In rejecting 'technological determinism'—the notion 'that technological change is an independent factor, impacting society from outside of society'[126]—and accepting that 'social groups shape technology'[127] it provides insights into the multiple factors that influence a technology's development and that decide if, how, and when it becomes successful. It demonstrates that the development of optical telegraphy in Ireland was strongly influenced by international political, military and technological factors, but also intensely shaped by internal factors. Thus, the study of technology provides valuable insights into much larger historic concerns such as patronage; the influence of learnt societies; networks of civic, political and social influence; as well as the impact of external factors, in this case French invasion and war, on the course of Irish history.

[126] Donald MacKenzie and Judy Wajcman, 'Introductory essay: the social shaping of technology' in Donald MacKenzie and Judy Wajcman, *The social shaping of technology* (2nd ed., Maidenhead, 2006), 3-27: 5.
[127] Ronald Kline and Trevor Pinch, 'The social construction of technology' in Ibid, 113-6: 113-4.