Using Cognitive Tunnels in a New Approach to Building Social Elevators in the Information Society

Thomas B. Kane
Dept of Management, Work and Organisation, Stirling Management School
University of Stirling, UK FK9 4LA
E-mail: t.b.kane@stir.ac.uk

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We are on the verge of developing artificial intelligences that may dwarf the capabilities of human intelligence. How we will interact and thrive alongside such intelligence will be a pressing societal problem. This paper addresses the question of the intelligence of "artificial persons" (organisations of people) that already exist in our modern world. A particular issue – social exclusion from the artificial persons of top professions – is explored. The paper shows how cognitonics, using telepresence, cognitive tunnelling and an advanced dialogic framework, based on the viva voce form of the Turing test, can support society in opening up pathways to its advanced professions for all of its youngsters; and at the same time train its artificial persons to work harmoniously with the other members of society. Learning how to have meaningful social dialogue with artificial persons, may be of societal value as we prepare to live among artificial persons that employ their own artificial intelligence.

Povzetek: Opisan je nov pristop v informacijski družbi s pomočjo kognitivnih tunelov.

1 Introduction

Over the last few decades, it has become possible to observe a large number of distortions in the development both of the personality and of society caused by the rapid development of information and communication technologies (ICT), globalization processes, and the preponderance of commercialized values. As a reaction to this situation, a new scientific discipline (and simultaneously a branch of the humanities) called *cognitonics* has emerged [1 - 6].

The principal aim of cognitonics is to combine the efforts of scholars working in various fields in order to find systemic solutions to compensate for the distortions and to establish preconditions for the harmonic, well-balanced development of the personality.

This paper explores an issue in the field of education. When a teenager is close to graduation from high school, he/she needs to possess well developed cognitive skills of processing information and to possess a broad mental outlook in order to understand what is his/her calling. Following Fomichova and Fomichov [7], calling could be described as the most important work the person could do, in which he/she would be most difficult to replace.

However, by the end of high school, a very considerable number of teenagers have a rather narrow mental view of the possibilities before them, and don't consider many professions where they may be able to find a calling. There are complex reasons for this, both personal and societal.

In the case of youngsters from state education systems, a contributing factor might be that societal tools of our modern cultures, the institutions of our advanced professions, are inadvertently colluding with complex education systems to exclude talented youngsters from fully developing while they are at school, thus rendering them unfit for tertiary education, or for reaching the height of their natural potential within the advanced professions. The result of which, being to contribute to social immobility throughout society.

Within Artificial Intelligence is the notion of Singularity [8], the point at which computer intelligence will finally exceed human intelligence. Ray Kurzweil, who has predicted that the moment of this achievement will be in 2045, has also predicted that in that world, it will be possible for humans to decide how long they want to live, merge with technology, and participate in unimaginable adventures of the imagination.

Although the Singularity is still some way off, we already live in a world of artificial persons - organisations of people. The artificial persons of our modern world (national authorities, local authorities, education systems, businesses, affiliations) are tools of society. They can be composed of a few, or thousands, or even millions, of people at the same time. They have their own reasons for existing, have relations with natural and artificial persons, they offer services and have codes of conduct with which their members must conform. These persons operate a functional, artificial intelligence, in our societies.

This paper presents a *dialogic* framework, an adaptation of the Turing Test[9], suitable for establishing Turing Test-like dialogue between artificial persons and

natural persons in a communications-rich world of social networking and *telepresence*. The framework sees the intelligence test lodged in the real-world, and put in the hands of stakeholders who are involved in the issues of intelligence being explored and for whom the dialogue explores contextual and time-critical issues. If the experience is recorded, then the record can be analysed by multiple stakeholders.

We are also in a philosophical era that questions whether we have wholly "brainbound" minds, or extended minds[10] which overlap between the organic being and cognitive tools in the real-world around us. Andy Clark compellingly argues that human beings are natural-born cyborgs[11]. He also notes that as mind extension technologies develop, "It is simply up to us, in these critical years, to try to guarantee that *human*-centred technology really means what it says: that human means all of us and not just the lucky few."

Artificial persons of our society are supra-cognitive tools capable of working with many natural minds for a range of functional purposes. Perhaps these artificial persons have become adept at exploiting multiple forms of intelligence, by successfully inhabiting the minds of other beings for their own intelligent, self-serving, purposes. Dealing respectfully with such artificial persons, and the difficult societal questions they raise - exploring them and their relationships with natural persons; might help us to deal with the Kurzweillian forms of intelligence that are evolving artificially. This paper focuses on probing intelligence that already exists within an artificial person, and exploring the organisational extended-mindedness that sees natural and artificial persons use many minds in pursuing their goals.

Telepresence technologies can now connect functioning parts of the world together in a way that was unimaginable even 5 years ago. The proposal in this paper is that societal functions actively seek to employ these technologies to cognitively link operational parts of society with the educational parts of society so that all pupils have a chance to develop higher language skills, feel their way into professions, network, and understand the world around them as it is. Such work will open real-world opportunities to pupils at school and could help to challenge the negative effects of social immobility in an immediate way and with intelligence.

2 Telepresence and cognitive tunnelling

Minsky [12] introduced the word ``*telepresence*" into the language. He imagined people at work physically controlling apparatus that is far away from them (perhaps it could be roving mining equipment that is present on Mars; perhaps it could be control functions that are present in a nuclear power station that is flooded with radiation) with a sense of connectedness. Today, *telepresence* is a term that is sometimes used for *immersive videoconferencing*. Types of videoconferencing that could be described as telepresence in Minsky's terms include situations where young people need to be protected from the overwhelming nature of an event, such as giving evidence at a criminal prosecution, and are allowed to give evidence from abroad. In such cases, the important part of the link is that the young person is both present and absent at the same time.

A major task of such telepresence links is to keep the contributing environments within their normal work routine, and to construct protocols of expression that allow the fullest possible means of communication. In terms of telepresence, a great deal of parallel effort, operating at different organisational levels, is employed to produce the necessary conditions. Too much of educational videoconferencing is currently showcase activity - where dialogue is made inferior to the importance of broadcast; questions are allowed in time slots at the end of a presentation; events describe issues not of the moment, but of the past; where presentation professionals rather than educationalists or the professionals who do the work are involved in the link. In order to guard against the inauthenticity of such issues we focus on creating a telepresence at events as they are happening, and with the people who are involved.

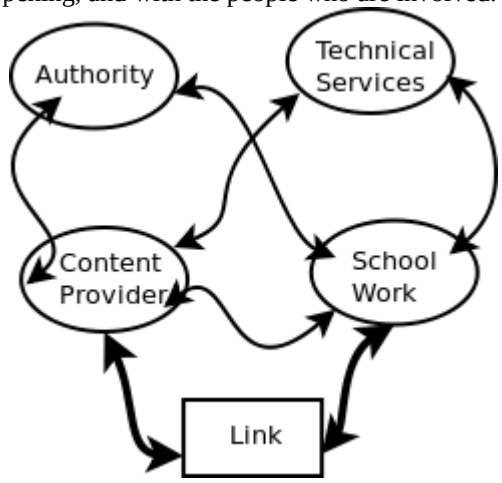

Figure 1: Producers of a Real-world Link.

Real-world educational videoconferencing falls into two types of activities: production activities, and educational activities. A successful real-world link involves a partnership between four artificial persons: educational authority, a content provider, a school group, technical services provider, and a separate programme co-ordinator (who may be a natural or artificial person).

Note that all of these organisational levels are contributory stakeholders in the link. They have different points of view on the importance of different aspects of the link. All of the contributing factors can be explored *dialogically* by persons within their own organisational silo, and by other persons who are outside of it.

In the simplest videoconferencing setup two environments are linked. At each site there is a camera, an eye, and a microphone (an ear) that can be used to focus the attention of the other, and a number of ICT items that can be used to deliver semiotic images to the other side.

A communal communication model that takes into account a variable number of people in each contributing

point, and the multiple ways of sending, receiving and contemplating the utterances of the dialogues makes it clear that the members of the school classroom form a single artificial person. If we imagine that each natural person is given a hat for each artificial person that they can represent, we see that each pupil has, for example, a school hat, a particular classroom hat, a person hat, a social background hat. Each professional in dialogue with the class has at least the following hats: a unique natural person hat, one hat for each Artificial Person that they are a member of (as many as are appropriate to the link), a personal environmental hat, etc. The task of analysis is to be aware that there are multiple natural and artificial persons being represented in each real-world link. The educational task is to navigate the pupil through the process of learning about the real-world in a way that is consistent with pupils pursuing the requirements of the school curriculum.

The communication model needs to encapsulate the artificial person that is the classroom, and the artificial person that is the real-world content provider, in such a way as to allow these to unfold into the various natural people who are participating. That model needs also to allow parallel transmission and reception of all forms of communicable message that can be captured by the telepresence equipment -- and to allow participants to acknowledge and record impressions.

Figure 3 shows two artificial persons joined in a link. Each has

- a receiving function that receives all inputs that have been transmitted,
- a collegiate group function that produces the utterance that represents the dialogic response to received signals,
- a production function, that sends a fresh set of messages back.

Many messages can be sent at the same time, and anything that can be detected and transmitted can be reckoned as part of a potential communication.

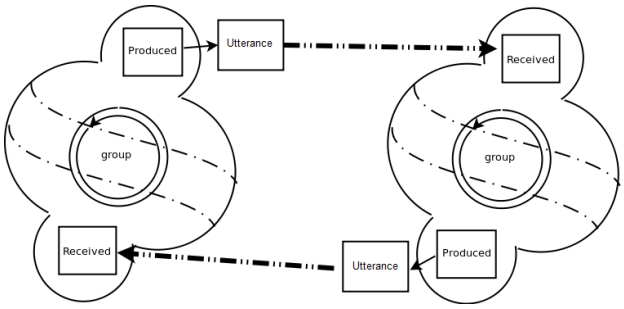

Figure 2: Communications Between Artificial Persons.

In examining all communicatable signals to be read in parallel as part of the communication, we bring a very interesting problem to Bakhtinian analysis. With appropriate questions, we make the task open to the extended Turing Test much more valuable to those who seek to understand the world of artificial entities of multiply contributed intelligences.

2.1 Cognitive tunnelling

Telepresence allows us to link pupils to a place of work where cognitive capacities are called upon, and for a while to join the classroom environment with that external environment. (For some young people the cognitive distance between their living environment and these external working spaces might as well be the distance to the moon.) The task is to focus on material that minimises the cognitive obstacles that lie between work pupils are currently capable of doing in class and the work they would be expected to perform if they were in the external place of employment.

Classroom learning areas transform to a stage upon which pupils can perform, and from which they can draw on school objects and achievements. Similarly, the working environment becomes a stage, and working materials of an expert can be brought into a link. Each stage setting is slightly removed from the working environment to satisfy the requirements of the link.

Figure 3: Art Gallery with Art-Classroom.

The challenge is to develop appropriate educational/real-world scaffolding [13]: to allow the contact to be an authentic engagement between pupils and the real-world, to remain in the pupil's mind, and to familiarise the young people with professional activities that they themselves might perform later in life as a result of their education and professional development. We describe the work in this area as "*cognitive tunnelling*".

With suitable educational scaffolding, young people can be asked to engage with the real-world as it is (and, even, as it changes), and for the real-world to engage with pupils as they are developing. A key issue in working with socially excluded pupils is in joining the environmental languages of the pupils -- their local accents, idioms, dialects - and the professional languages -- technical terms, idioms, jargon - of working spaces using Bakhtinian [14] techniques of hybridization and dialogue.

3 Anatomy of a real-world link

The city of Glasgow has linked all of its 29 state high schools into a shared videoconference service network that allows business quality links to any classroom in any high school in the city. The link we are dissecting was \ part of a programme called ``Listening to Young People". The programme engaged young people in schools throughout Glasgow with the Scottish Parliament and with the Civil Service. This school involved in this

link was Holyrood High School – one of the largest high schools in Europe.

Educational Authority -- Glasgow City Council Education Department had the vision, relationships, power and financial ability to promote the endeavour and make a link viable (within all social obligations) and interesting. This is a level of Leviathan which is below city government level.

Real-World Content Provider -- The Scottish Parliament, an artificial person, provided a real-world scenario for the schools as an educational experience. Understanding the parliament forms part of the school curriculum. The link was with a Member of the Scottish Parliament, Frank MacAveetie, who had been a teacher at Holyrood High School; and with one of the parliamentary education officers - who brought the parliamentary mace.

The link sought to explore real-world knowledge which is experiential, drawn from the content provider's daily activities and of their operational procedures, which is open, which is harmonised with classroom learning, which can afford interaction and allow pupils a real-world experience.

Figure 4: Modern Studies Class to Scottish Parliament.

Active Curricular Schoolwork—The class was a first year secondary school (aged 11) Modern Studies class, who were studying the Scottish Parliament. The published Curriculum[15] requires the following capacities:

I can investigate the features of an election and the work of representatives at a local, national or European level to begin to develop my understanding of how democracy works.

SOC 2:18a

I can evaluate the impact which decision making bodies have on the lives of people in Scotland or elsewhere

SOC 4:18a

I can debate the reasons why some people participate less than others in the electoral process and can express informed views about the importance of participating in a democracy.

SOC 4:18b

Technical Services Providers -- provider of link from where exactly in the school to where exactly in the real-world. Technical services also have to support users in how to set up camera positions and how to present themselves effectively for transmission. This area of coordination ranges across the educational Internet/communications service provider, the technical support officers at education services, schools and the external places of interest. Smooth coordination here is the technical achievement of the link. This link was between the pupils classroom and a Parliamentary committee room.

Educational Event Producer, or Programme Coordinator -- These four areas mentioned above have occasional need to be coordinated during the period of the educational activity.

Because the link is scheduled to happen at a particular time and there is a matching of the working day with the school day, there are often small problems that need to be addressed in each of the four areas, and there is always a need for communication between one area of expertise and another (e.g. local authority and real world provider). A fifth category of expertise that co-ordinates the real-world educational intervention, sympathetic to the real-world time and content constraints between classroom, service-provider, content producer and educational authority, is introduced here as the Educational Event Producer, or Programme Co-ordinator. Any tool or person involved in this kind of work needs to be concerned with the quality of the communications and needs to ensure that co-operation between parties takes place appropriately.

It may be that the creation of this space of dialogues may be a plausible example of how a Clarkian extended mind space is produced, in which cognitive activities operate dialogically and mental contents can reside inside, outwith and alongside a natural person.

3.1 The link

The link was for 30 minutes and followed the format:

1. General Welcomes -- welcome to Parliament, Frank MacAveetie; welcome to Holyrood, by deputy head, Bernie Pollock
2. Classroom teacher, Mrs Brady engages with contributors, introduces class
3. Presentation from MSP on Parliament
4. Questions from Class to MSP and Education Officer
5. Questions to class from MSP
6. Goodbyes and round up

One interchange with Mr MacAveetie, regarding homelessness solicited a professional response that crossed all the languages involved in the link -- the local, the educational, the personal, and the professional. The question regarded finding a political solution to homelessness, and Mr MacAveetie spoke of a member of his own family, a 71 year old, who was a street vagrant. And then he said:

"But it's not just 71 year olds that are on the streets. I've even seen former pupils of mine who have got heroin problems, actually begging on the streets of Glasgow and it actually breaks your heart, because those young boys in particular used to play on your school football team. They were as fit as a fiddle, and then at 16 and 17 they suddenly get into drugs, and there they are at 23, begging on the streets of Glasgow from their former teacher."

The live experience of such a link is very powerful. This videoconference was recorded, as where constructive dialogues between contributors at all levels of the cognitive tunnel. These recorded objects are available and can be constructively, subjectively examined (for example, by pupils involved, or stakeholders elsewhere), and the humanity of the contributions can be debated, with a view to making improvements. Such materials, when shared across all state schools, could make it possible for all schools to benefit from every link. Once a complete real-world programme has been co-ordinated for the first time, it can then be improved upon from within any of the contributing areas of expertise.

In any links between schools and professionals, there is a need to separate out the voices that represent the organisations from the voices of natural persons who are involved in them. In this regard, it is important to focus on how natural persons work with artificial persons.

4 Meetings with artificial persons in the information society

Thomas Hobbes [16] introduced us to Leviathan, which he described as a commonwealth, or state, "which is just an artificial man---though bigger and stronger than the natural man, for whose protection and defence it was intended", supplying analyses of the social contract natural people accede to in joining up with Leviathan, the civic responsibilities attendant upon the social contract, and how natural people within Leviathan should be governed -- by sovereignty, democracy or aristocracy. The frontispeace of Hobbes book showed a crowned monarch whose body and arms were composed of many human heads, all looking up to him.

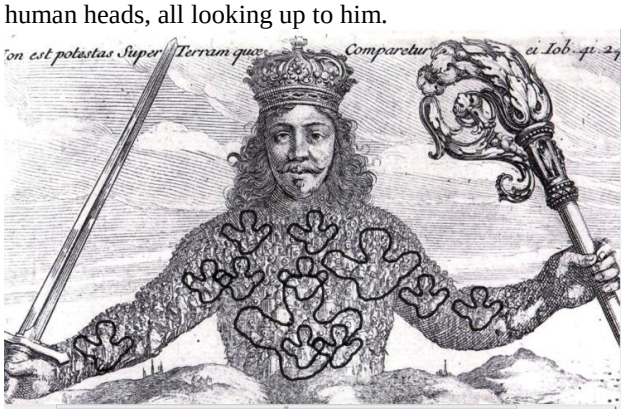

Figure 5: Leviathan - None Like Him.

What Hobbes did not foresee was a time when organisations of people within Leviathan's body, would become lesser artificial persons, and would grow to Hobbesian commonwealths themselves, each with its own goals and social contracts. Figure 1 shows what the frontispiece might look like today.

Organisational behaviour [17] is the study of the behaviour of people involved in organisations, and the organisations themselves. There are three main areas:

- the study of individuals in organisations (micro);
- the study of work-groups in organisations (meso), and
- the study of how organisations, themselves (macro), behave.

It is worth noting that even in an Artificial Person, the intermediate level between micro and macro levels allows for the existence of sub-artificial person recursion within a single artificial person. Artificial Persons develop their own cultures and seek to thrive in the culture around them [18].

With such definitions we see Artificial Persons as complex, constructed societal objects, cognisant insofar as they borrow the cognitive abilities of members of the commonwealth. They are cognisant tools of society, dispersed across space, capable of being present in different ways, capable of defining themselves axiomatically, capable of organising themselves recursively, knowledgeable about their rights and history; and able to self-reflect in a communal way, able to take care of themselves in the present and choose policy and goals for the future.

Both Artificial Persons and Natural Persons have narrative history. Insofar as any person is part of more than one artificial person. For each of these that we slip between on a daily basis, there is its own narrative, the shared narrative between individual and group, and any sense of Leviathan relationships or injunctures. Each person in the multiple-lines of real-life storytelling, moving from language to language as they represent other artificial persons and occasionally their own self.

In searching for a definition for an artificial persons that could be a realistic player in the imitation game, this paper proposes that any person that conforms to a narrative account of personhood could be considered as one that can participate in the new Turing Test. Such a person needs to be capable of seeing itself in its own story and being able to tell its own tale. Following Bruner [19], e describe such a person as one who is:

- teleological and agentive
- sensitive to obstacles
- responsive to judgements
- capable of selective remembering
- oriented towards reference groups and significant others
- possessive and extensible
- able to shed values and possessions as required
- experientially continuous over time, despite striking transformations
- sensitive to where and with whom it finds itself
- accountable
- moody, affective, labile and situation-sensitive
- seeking and guarding coherence

Such a definition of person covers natural and artificial persons. The framework will allow any artificial person that encapsulates these traits to participate in the dialogue. Such persons can include legalised and informal groupings of persons, whether those be familial, social, or functional in any way.

A thesis of this work is to recognize that complex relationships exist between natural and artificial persons, see if artificial persons are as capable of being deceptive and self-serving as natural persons. Human intelligence in this complex world is not simply a matter of seeking consistent behavior: indeed, much intelligence might be involved in the judicious applications of non-consistent behaviour over a period of time. We seek to explore the true intelligence, or multiple intelligences of artificial persons through what they say, what they do, how they do it; and analyse the material with the forensic effort of that French[20] applied to the Turing test[9].

Today, a natural person might be a member of any number of different artificial persons at the same time, and may be torn in behavioural terms between differing social contracts. Some of these artificial persons might partner one other, some may be at odds with one another.

We can also explore extended mindedness from the point of view of the artificial person towards the use of natural persons -- that natural persons are extended mind tools of artificial persons. In seeing an artificial person as a person, constituted of many natural (and possibly some lesser artificial) persons; the artificial person is not so much "extended minded" as "many-minded". That is, its cognition is the result of composite, parallel activities, being contributed by many minds (owned by a number of other natural and artificial persons).

The framework presented here aims to allow higher and higher cognitive levels of Leviathan to examine and direct the policies of its members in acceptable forms of social behaviour.

5 Questions for artificial persons

Suitable questions should engage the artificial person as it goes about its business, just as Socrates engaged with citizens in their element while he wandered the streets of Athens. Questions could be asked that address complex societal issues that probe natural persons and artificial persons alike. For example, in social mobility.

The Organisation for Economic Co-operation and Development (OECD) has described[21] very troubling social mobility issues in the United Kingdom: e.g. more than 50% of youngsters will grow up to have the same salary as their father. The Sutton Trust [22] shows that 53% of the UK's most influential people were independently educated, including 24% of university vice-chancellors, 32% of Members of Parliament, 51% of medical consultants, 54% of top journalists, 70% of High Court judges… when only 7% of the UK population are.

Top Universities in Scotland have been criticised for the low numbers of students being taken from the most disadvantaged areas. In response to criticism of the University of St Andrews in this regard [23], the principal of the University highlighted the difficulty of finding sufficient numbers of plausible students with the appropriate grades in deprived parts of society. The worry being that underqualified students would not be capable of doing well at St Andrews. Response from a government advisor, acknowledged that there is a real problem of social inequality, and that social origins of inequality go to "differences in language and brain development".

And yet, we know that academic ability is randomly dispersed across all socio-economic groups and that advanced societies endeavour to seek out the best talents within the population to fill top professions. Runco has found that creative projects[24] which do not focus on cultural tropes are especially suited to helping talented youngsters from disadvantaged backgrounds to develop their unique creative talents. Links with telepresence are known to be immersive and focused on personal effort and creativity. Such educational work that had direct links with direct activities of the real-world could raise the consciousness of the pupils and establish a route into the professions.

Currently, there is a barrier before youngsters in deprived areas in reaching tertiary education; and there is a further barrier before fully educated qualified youngsters in reaching the top of the professions if they have not been privately educated. Such issues suggest that we may have already arrived at a Singularity-like situation in modern-life. This is a question whose scope covers the space of the societal education system as a whole; and the societal employment institutions as a whole -- both of which can be considered as Artificial Persons within the national state Leviathan, who are in some ways governable by Leviathan.

It is difficult to see which of the two hypotheses,

- collusion and exclusion between educational establishments and employers, or
- impaired cognitive development in all young people from socially deprived backgrounds

is actually the worst. Both hypotheses, whether true or false, certainly merit investigation. What is clear is that an engaged society could undertake steps to rectify any difficulties. The discipline of Cognitonics could be of assistance in this matter.

Schools, particularly those who are involved in educating youngsters from disadvantaged backgrounds, deserve an answer to the questions; "is there something that can be done to help our pupils reach the height of their potential in tertiary education"; and "is there something that can be done to help our pupils rise to the top of the professions when they have completed their education?". Schools could, as part of their curricular activities, seek out answers to such questions. Using telepresence and the dialogic framework schools can question persons, natural and artificial, while they are at work -- so that pupils can see how the world is, in real-time, so that they can learn from it.

With such questions, we have left Turing's parlour game and have started to explore the streets of Athens.

6 Supersizing the Turing test

Alan Turing's [9] test of machine intelligence derives from an imitation game, a parlour game, whereby a man (player A) and a woman (player B) are separated away from an interrogator (player C), and each are asked questions in turn, by means of a note delivered to each, by a messenger who acts on behalf of player C. The man is pretending to be a woman; and the woman is playing to have the truth be known. The fun of the parlour game for each player s to prevail. For player B it is to use truthful statements more effectively than player A is able to use misleading statements; and for player A, it is to overcome the truths of Player B, with a more compelling falseness.

In the imitation game, no-one questions the existence of intelligence in any of the participants; the fun is in watching how well intelligence is applied. In his paper, Turing says "The game (with the player B omitted) is frequently used in practice under the name of *viva voce* to discover whether some one really understands something or has learnt it parrot fashion.'" This version of the game, the basis of the proposed framework, involves an interrogator who examines a player specifically to uncover the completeness of their knowledge of "something".

Turing did not stipulate that the interrogator should be a singular, natural person. Consequently, the interrogator could be a group of individuals working together to perform the interrogation function. Thus, the interrogator may be an artificial person, made up, for example, of a group of guests at a party. Player A could be an artificial person (a group of people working together) in the same way. The dialogic framework allows a version of the Turing Test that supports dialogues between persons (either artificial or natural) as interrogator and player.

Using the *viva voce* approach means player A and player C can be as face-to-face as it is possible to be. And yet, they are one-step removed from the world of their activities - they are in a constructed place, derivative of the true work-space, and they enter a dialogue.

In these real-world meetings, between parties across many social classes who employ many individual languages, and produce new hybridisations of language, the depth of dialogic analysis of such meetings can be guided by the novelistic analysis techniques introduced by Mikhail Bakhtin [25 - 26].

Especially, this means that any semiotic capable of being recorded and transmitted by the telepresence equipment can be interpreted as an utterance; any utterance should be viewed through a chronotopic lens which respects the primacy of context over text; any action of any person can be seen as an act of dialogue between that person and the world [14]; and any professional or social language used for a specific purpose by a specific group can be seen as a professional "speech genre" [27] and can therefore be explored in relation to all other languages with the help of literary analysis.

The case for rigorous forms of meetings that respect such Bakhtinian approach to chronotope, utterance, intonation, dialogue and speech genres is made. If recordings of such links are made, in-depth analysis of the links can be made by many artificial persons, at many levels within Leviathan; and results can be pooled to aid in the development of policy to improve matters that are found to be wanting. This work would be in the cognitonic realm of the humanities.

7 Cognitonics, testing humanity, exploring reality

Topics for *Viva Voce* style Turing-tests that could be applied to the production of a link include:

A) Test of Educational Authority: Did the idea serve a valuable purpose? Was it worth the effort? Was it a diversion?
B) Test of Real-World Provider: Did the external party produce material suited to the pupils and the curriculum? Was this an authentic link with the real-world scenario, or could their real-world contact be shown to be self-congratulatory, cursory, inauthentic or unenlightening?
C) Test of Schoolwork Activity: Is the activity involved in this link related to curricular requirements and suitable to the age and development of the pupils involved? Can recording be used in class? Can learners reflect appropriately, or annotate the experience relevantly?
D) Test of Technical Services: Does the link respect the real-world context of all parties involved?
E) Test of Educational Impact: What impact had the school on the real-world? What token of reality passed from the real-world to the school?

Larger societal questions can be articulated and addressed. For example:

A) Harmony: How smoothly did contributors work together? Are there any societal issues that need to be addressed? Are there policies of artificial persons that need to be altered?
B) Collective intentionality: are particular artificial persons welcoming to all, or partial to a few? Do artificial persons use natural persons as shields?
C) Social practices and agreements between artificial and natural persons: are we tolerating inappropriate behaviours between artificial persons that is to the detriment of society?
D) Understanding: How do we construct the interpersonal dialogues that Socrates might have with the beings of our world where he here today - tailored so that we can understand the world as it is, and the world can know and understand itself?

E) Sustainability: How do we promote good relationships between natural and artificial persons within Leviathan?

Cognitonics [1 - 3, 28] enables us to recognise exclusion and societal under-achievement, reason it out, and then to use tools of ICT itself, to tackle it.

8 Conclusion

Understanding complex societal issues of the real-world as it daily goes about its business, has always proven itself to be a difficult task. A major issue has been in separating out the voices which represent artificial persons and the voices which represent natural persons. Today, communications technologies working alongside cognitive tools embedded within Artificial Intelligence make it possible for schools to ask probing questions of natural and artificial persons in the real world, and to examine how natural people move from artificial person to artificial person in society.

The paper suggests that a type of cognitive telepresence can be achieved by means of cognitive tunnelling, a term that is introduced to describe bringing pupils right to the working methods of natural and artificial people at work. Cognitive tunnelling presents a way of extending Vygotsky's scaffolding technique to places of live activity that are remote from the school.

The paper suggests that Bakhtin's extraordinary analysis tools for working on language, narrative and dialogue can help us to articulate and then to overcome cognitive hurdles presented to talented youngsters from disadvantaged communities. If such encounters are recorded and re-used, they can form material for Turing-Test-like, multi-level, multiply judged subjective assessments of the intelligence(s) within organisations, which could guide organisations in developing respectful relationships with natural persons. The ultimate aim of such work being to make all young people aware of the possibilities in their world and to compete for employment opportunities that present themselves at all levels of society.

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