THOUGHT READING CAPACITY

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INTRODUCTION

The Bible attributes to God the capacity to know the thoughts of men.[1] Most scientists are unaware that thought reading by electroencephalogram (EEG) was reported as feasible in work begun over 30 years ago,[2] which more recently a number of groups confirm. This review focuses on literature relating to technologic thought reading. The discrimination of more general cognitive states, brainwave capture methods, and evidence of covert thought reading development are also treated.

METHODS OF SPECIFIC CONCEPT RECOGNITION

The Defense Advanced Research Projects Agency in 1972 contracted Pinneo & Hall for work that a 1975 US technical report entitled "Feasibility Study For Design of a Biocybernetic Communication System." The study concludes "that it is feasible to use the human EEG coincident with overt and covert speech as inputs to a computer for such communication" (covert speech is defined as verbal thinking.)[2] The 149 page report[b] states: "enough information has been obtained . . . to specify the optimum parameters to use for an EEG operating system, and to suggest future research towards that end."

Pinneo & Hall utilized templates for EEG word recognition constructed by averaging EEG patterns evoked by 9 words in each subject for visually presented words, and primarily utilized 4 electrodes over brain language areas for prediction. People with high hemispheric lateralization had EEG patterns for some words that frequently classified 100% correctly, regardless of the number of repetitions with stability over time. Over all words, however, classification accuracy for these people was 85% for overtly, and 72% for covertly spoken words. Across all subjects specific word EEG patterns were classified 35% correctly for overtly, and 27% correctly for covertly spoken words, but more people were in the 70-100% classification range than in the 10-15% range.[c] Subjects with low hemispheric laterality, particularly stutterers had near chance EEG classification. EEG concept recognition was actually 10-15% higher for pictures rather than words. Phrases containing similarly articulated words or homonyms were better recognized than these words alone without context.

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[a] This article has been partly supported by substantial financial contributions from Christians Against Mental Slavery http://www.slavery.org.uk

[b] Pinneo's report does not include all experiments reported to the Defense Advanced Research Projects Agency in the six annual reports over the 3 year contract.

[c] Over the experiments presented by the report, chance would be from 6.5 to 14% depending on the size of tested vocabulary.

Suppes et. al. have the most extensive recent publications supporting and reporting specific EEG thought recognition.[3 4 5 6 7] This work largely compares recognition improvement methods with some emphasis on a relative invariance of EEG concept representations across individuals. The procedures generally utilized Fourier transforms of both templates and test samples with an optimal EEG frequency window, or filter selected for each subject. EEG word templates generated by averaging each subject's responses (50 trials) at single electrodes resulted in less recognition[3] than recognition templates averaged across all subjects (700 trials)[d] for bipolar electrode difference, which produced recognition rates over seven words of 100% for visual images and auditory words.[e 5] However, for visually presented words, recognition templates generated by excluding from the average the subject tested was better--75% than averaging within subject or over all subjects. The waveforms for each presentation modality were very similar, and when recognition templates averaged across subjects in the modalities of visual images or words were utilized for recognizing other modalities (visual images or words & auditory), recognition still was generally 60-75%. Such results were despite inclusion of three subjects with English as a second language, and obvious hemispheric laterality confounds important to Pinneo & Hall,[f] such as one left-handed and another ambidextrous subject. These results indicate a relative invariance of EEG representations for different concepts between subjects and perception modality, when averaging out and filtering noise. Matching templates to words is derived by template and word waveform amplitude difference sampled at 814 points as squared and summed (Pinneo & Hall had 255 samples per word.)

Also examined are brain wave patterns for sentences. Recognizing the first sentence word by the same words individually presented, and the same words in sentences when cut and pasted was successful at a 50% recognition rate (with 8.3% as chance.)[4] Even when excluding a subject from the averaged template, over 90% recognition was obtained for 48 sentences, as visually presented one word at a time.[6]

Averaged unfiltered auditory responses are classified 100% correctly by the superposition of 3 sine waves chosen from the frequency domain maxima for each word.[7] The same procedure when averaged across subjects and presentation modalities (visual images, visual and auditory words) classifies 100% of the words by 5 frequencies per word, while data fit decreased only 6% compared to the filtered templates. Syllable classification is less successful, with six correct classifications of eight from superposition of nine frequencies.

A Korean group reports yes/no decision discrimination of 86% by spatio-temporal cross correlation.[8] This was achieved from 4 electrodes over bilateral frontal and occipital sites. Differential equation measures of synchronization rate and average polarity also had high recognition rates of 78% and 81% respectively.

Other investigators publish magnetoencephalographic (MEG) visual specific word recognition above chance significantly by 27% for recognition and 44% for accuracy.[9] Although these results were only somewhat above chance, MEG also was less successful for Suppes et al.,[3 4] and a speech recognition optimized artificial intelligence system was utilized without filters or recognition templates. The authors expressed

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[d] Suppes points out that this may have been due to increased averaging per se.

[e] Though apparently only single electrodes or pairs were utilized for prediction, the best recognition rates were not always from the same electrode of pair.

[f] Almost half of the Pinneo report is devoted to resolving such confounds.

surprise that any recognition was possible, considering that input utilized only a simple technique; root mean squares of foci.

There is apparently a Russian report of specific EEG word recognition before 1981.[10] The work is only known from a science reporter, and specifically unavailable, but is mentioned to aid this report's discovery, and because of the claim that specific words contain category information, which has interest for word category differentiation studies.

There are also patents of EEG thought recognition. Electroencephalographic (EEG) instant detection by syllables of "a content of category which the testee wishes to speak" quotes Kiyuna et. al. Patent # 5785653 "System and method for predicting internal condition of live body." [11] A stated use: "the present invention may be use (sic) to detect the internal condition of surveillance in criminal investigation" by EEG. NEC Corporation licensed this patent. Mardirossian Patent # 6011991 "Communication system and method including brain wave analysis and/or use of brain activity" includes remote EEG communication with armed forces or clandestine applications.[12] This patent proposes transmitter capable skin implants, utilizes artificial intelligence, and is licensed by Technology Patents, LLC.

A further study of brain blood flow by Functional Magnetic Resonance Imaging (fMRI), confirms that viewing pictures of objects activates specifically identifiable brain patterns. Comparing the distributed brain activity observed by fMRI for viewing faces, houses, cats, chairs, bottles, shoes, and scissors were 90-100% correct in all two-category comparisons (with 50% as chance.) [13] Even though all these objects were described as categories because different types were viewed, discrimination of these objects generally requires an adjective, so that the distinctions qualify as specific concepts.

Numerous fMRI studies show similarly activated brain regions for viewing images or words, and hearing words. Viewing pictures of objects or the word naming them activates similar distributed brain systems for storing semantic knowledge,[14 15 16] and auditory presentation also shares the same[17] or a similar[18] system with that of viewing these words. These studies give anatomical basis for the high cross modality recognition rates of concepts observed by Suppes et al.[5 7]

PHYSIOLOGIC DISCRIMINATION OF WORD CATEGORIES

Broca and Wernicke originally defined anatomy pertinent to aphasia resulting from brain injury.[19] More recently very selective agnosias of brain lesion patients, which result in an inability to name or recognize specific object classes, are described.[20 21 22] Many word category differentiation reports reviewed below were initiated to explain and substantiate such deficits. This literature is consistent with specific word recognition, because word responses are averaged by category, and distinguished with only statistical inspection without template generation or specific comparison required for thought recognition. Brain cell assembly activation provides a theoretical framework for both specific concept recognition, and word category discrimination.[23]

Evoked EEG responses discriminate nouns and verbs. Nouns elicit more theta power than verbs, but verbs have greater theta coherence decrease, particularly in frontal versus posterior sites.[24] Noun waveforms generally are more negative than verb responses at post-stimulus intervals of both 200-350 and 350-450 milliseconds (msec.)[25] [26] [27] [28] Ambiguous noun/verbs are more negative than unambiguous nouns or verbs in the early latency interval, and when context indicates noun meaning versus verb use, are more negative over both these latency windows.[28] Anterior-posterior electrode activity also differs for ambiguous versus unambiguous nouns and verbs.[28] [29]

Action verb waveforms differ in amplitude,[26] and central versus posterior distribution compared to visual nouns,[30] with particular 30 Hz increase over the motor cortex for action verbs, and over the visual cortex for visual nouns.[31] [32] Face, arm, or leg action verbs differ in amplitude by time interval, and activity increases over the specific corresponding motor strip locus as well as by frontal electrode.[33] [34] Low resolution electromagnetic tomography finds irregular verb activity more in the left superior and middle temporal gyri, while regular verbs are more active in the right medial frontal gyrus at 288-321 msec.[35] Irregular verbs respond more in the left ventral occipito-temporal cortex than regular verbs at ~340 msec. by MEG, which localizes perpendicular sources undetectable by EEG.[36] Regular verb activity modulates more the left inferior prefrontal region including Broca's area at ~470 msec with MEG, but irregular verbs have more right dorsolateral prefrontal cortex activity at ~570 msec. Priming evoked patterns occur for regular but not irregular verbs,[37] [38] while incorrect irregular noun plural[39] and verb participle[40] [41] waveforms differ from that of incorrect regular forms.

Abstract word waveforms onset more positively about 300 msec., persist longer at lateral frontal sites, and distribute more to both hemispheres compared to concrete words.[26] [42] [43] β-1 frequency coherence during memorization of concrete nouns indicates left hemisphere electrode T5 as the main brain processing node.[44] Left hemisphere electrode T3 is similarly important for abstract nouns, which have more frontal area contribution, and massive right posterior hemisphere coupling. Abstract versus concrete memorization distinctly changes other frequency bands,[45] [46] and theta synchronization predicts efficient encoding.[47]

Content words yield a more negative peak at 350-400 msec. than functional grammar words, with a subsequent occipital positivity that function words lack, and more electrode and hemisphere differences from 400- 700 msec.[48] [49] In sentences, the late component of function words resembles preparatory slow waves that apparently subserve their introductory and conjunctive grammatical function.[50] Other studies show content versus function word differences at additional intervals and more bi-hemispheric effects,[51] with right visual field advantage for function words.[52] MEG distinguishes functional grammar words, or content words such as multimodal nouns, visual nouns, or action verbs, each by response strength and laterality at intervals of both ~100 and greater than 150 msec.[53]

Proper name amplitudes peak more just after 100 msec. negatively, and just after 200 msec. positively than common nouns, while one's own name accentuates these peaks relative to other proper names with further positive and negative components.[54] Proper names, animals, verbs, and numerals show electrode site differences: proper name temporal negativity extends to inferior electrodes bilaterally; verbs and animal names are

less negative and similar, but verbs have left frontal inferior positivity; while numerals have less waveform negativity, and bilateral parietal positivity.[55] Non-animal objects are more negative in both the 150-250 and 350-500 msec. intervals than animals, while animals are more positive in the 250-350 msec. interval.[56 57] Animals are more positive in approximately the same latter interval than vegetables/fruits, while vegetables/fruits are more negative in about the earlier interval (150-250 msec.), and have stronger frontal region current sources than animals.[58] Animals in natural scenes evoke different waveforms than just natural scene or building pictures.[59] Responses to words for living things are less negative over the right occipital-temporal region than artifactual objects, while pictorial presentations of the same items further differ and have hemisphere effects noted as unreported.[60] EEG waveforms for specific meanings could be as discretely categorized as indicated by the reported but unspecified Russian work, which claims that "the waves for such concepts as "chair", "desk", and "table" are all overlapped by another wave that corresponds" to the concept of furniture.[10]

Affective word meanings such as good-bad, strong-weak, or active-passive are discriminated[61] by both category and meaning polarity according to response latency, amplitude, and scalp distribution at intervals of 80-265 and 565-975 msec.[62] Positive words have amplitude increases peaking at 230 msec. compared to negative words, and relative to neutral words increase a subsequent peak amplitude as well as a slow wave component.[63] Emotional words also show less amplitude decrease on repetition than neutral words.[64]

Some of these word category differentiation reports are consistent with both the specific recognition reports, and/or the discrimination of non-verbal cognition. Based on EEG/MEG responses, words are readily distinguished from non-words,[65 66 67] pictures,[68] and as to length.[69] Even commas have a characteristic waveform similar to the speech phrase closure evoked pattern called closure positive shift.[70] Color selection modulates the EEG.[71] EEG discriminates the judgment of gender for both faces and hands.[72]

Positron Emission Tomography (PET) and Functional Magnetic Resonance Imaging (fMRI) Word Category Discrimination

The more recent techniques of Positron Emission Tomography (PET) and Functional Magnetic Resonance Imaging (fMRI) localize brain blood flow, with ability to distinguish perceptual categories. Some studies locate recognition of places[73 74] and faces[75] within certain brain areas, however, expertise can recruit the face recognition area,[76] and other studies show these areas only responding maximally for specific stimuli.[77] Word category activity is both distributed and overlapping[77 78] in a somewhat lumpy manner.[79] Though regions of word category difference are indicated below, brain comprehension is not solely dependent on these areas. Discrete category responsive emergence may have some resemblance to category segregation in the feature processing of artificial neural networks that self organize without programming.[80]

Meta-analysis of 14 studies locating activity for face, natural, and manufactured object recognition shows ventral temporal cortex difference. Face recognition activates more inferior ventral temporal portions including the fusiform gyrus of which manufactured objects activate more medial aspects than face or natural objects, yet natural objects distribute more widely in this region.[81] Eighty eight percent of face

studies converged for mid fusiform gyrus activity, while natural and manufactured objects converged no more than 50% for any discrete area. Manufactured object activity locates to the middle temporal cortex from natural objects, which locate more in the superior temporal cortex. Face and natural object activity is more bilateral, and in the left inferior frontal cortex, while particularly tools activate the premotor area. These studies also feature activity in the inferior occipital/posterior fusiform and the medial occipital structures of lingual gyrus, calcarine sulcus, and cuneus.

There is some agreement that verbs have greater activity in temporal, parietal, and premotor/prefrontal regions than nouns, while nouns have little[82] or no[83] greater activated areas than verbs, yet no noun/verb difference is also reported.[84] German regular noun and verb fMRI responses compared to irregular words differ significantly in the right precentral gyrus, the left prefrontal cortex, bilateral posterior temporal lobes, and bilateral complexes including superior parietal lobules, supramarginal gyri, and angular gyri.[85] Regular words are left hemisphere laterized, while irregular words have somewhat greater distribution to the right hemisphere, and a greater activation over all cortical areas. Irregular verbs activate more total cortex than regular verbs, but lack motor strip, insular, and most occipital cortex activity present for regular verbs.[86] Though both forms activate the inferior parietal lobule, irregular verbs activate more posterior and superior portions than regular verbs

Depending on control task correction, naming actions activates the left inferior parietal lobule lacking for locative prepositions, which activate the left supramarginal gyrus selectively from actions.[87] Furthermore, naming abstract shape location compared to locating concrete items increases right supramarginal gyrus activity,[87] which specifically also activates on long-term memory for spatial relations[88] and in American Sign Language prepositions.[89] The supramarginal gyrus is encompassed by the temporal-parietal-occipital junction active for location judgments, and is separate from temporal activity for judging color.[90] Action word generation activity is just anterior to the motion perception area, while color word generation activity is just anterior to the color perception area.[91] Naming object color activates distinct brain regions from naming the object, with color knowledge retrieval activity being slightly removed from that of naming colors.[92] Irrespective of language and visual or auditory modality, the naming of body parts activates the left intraparietal sulcus, precentral sulcus, and medial frontal gyrus, while naming numbers activates the right post central sulcus as joined to the intraparietal sulcus.[17]

Concrete words are discriminated from abstract words in noun or verb forms,[83] with more right hemisphere activity for abstract words than concrete words.[93 94 95] Abstract/concrete contrasts feature both right and left temporal areas, while the reverse concrete/abstract comparison features frontal activity.[96 97 98 99 100] Besides distinction from abstract nouns, the concrete categories of animals contrasted to implements respond selectively in the posterior-lateral temporal, and frontal cortex areas across studies.[93 98] Limbic activity, particularly the cingulate, distinguishes emotional words from both abstract and concrete words.[94] .

Naming pictures of animals, tools, and famous people are discriminated[101] by increased regional blood flow in the left inferior frontal gyrus for animals, premotor area for tools and left middle frontal gyrus for people.[102] Faces activate the right lingual and bilateral fusiform gyri, while the left lateral anterior middle temporal gyrus response

differs to famous faces, famous proper names, and common names.[103] Particularly the left anterior temporal cortex responds to names, faces, and buildings when famous relative to non-famous stimuli.[103 104] Viewing photographs of faces, buildings, and chairs evokes activity distributed across several cortical areas, which are each locally different in both the visual ventral temporal[77] and occipital cortices.[105] Photograph perception of these same categories has more hemispheric lateralization and activation than non-perceptual imagery,[106] while short-term memory face imagery activity is stronger than that of long-term memory.[107]

More advanced fMRI techniques discriminate further word or object classes. In a high resolution fMRI limited brain cross section study, the activity differs for animals, furniture, fruit, or tools in discrete sites of the left lateral frontal and 3 separate medial temporal cortex loci respectively.[108] The application of artificial intelligence to fMRI pattern distinguishes between 12 noun categories (fish, four legged animals, trees, flowers, fruits, vegetables, family members, occupations, tools, kitchen items, dwellings, and building parts.)[109] As already mentioned, comparisons of the network of fMRI activity recognize responses for viewing faces, cats, houses, chairs, scissors, shoes, and bottles, with recognition accuracy ranging from 90-100%, which[13] effectively is fMRI substantiation of specific thought reading.

Some cognitive functions are related to or partly dependent on language. Letters activate the left insula more than objects and exclusively the left inferior parietal cortex.[110] Letters also activate an area in the left ventral visual cortex more than digits in most subjects.[111 112] Brain activations of mathematical thinking are partly dependent on language.[113] Subtraction activates bilaterally the anterior intraparietal sulcus and a phoneme area in the intraparietal sulcus mesial to the angular gyrus, selectively from simple motor tasks.[114] Number comparison activates right hemisphere intraparietal and prefrontal areas, while multiplication localizes more to the left hemisphere.[115]

ELECTROENCEPHALOGRAM DISCRIMINATION OF OTHER COGNITIVE STATES

Other literature indicates EEG differentiation of completely non-verbal cognition. Greater left prefrontal activity predicts positive affect, while greater right prefrontal activity predicts negative disposition in psychological testing.[116] However, the stability of hemispheric activation is important for such a trait characteristic,[117] and more transient mood states have exactly the opposite arousal symmetry.[118] Decreased left prefrontal activity is also found in depression,[119 120] and the anxiety situations of social phobics.[121] Patented is more specific attitude, mood, and emotion differentiation, by plotting at least two and as many as five EEG frequencies, with reference to Air Force research.[122] EEG patterns discriminate relative misanthropy and philanthropy in facial preferences, and favorable or negative responses to faces,[123] while waveform topography identifies sad face perception.[124] Another EEG emotion indicator is the stimulus-preceding negativity (SPN.) Although slight SPNs can precede instruction cues, this wave is most pronounced while awaiting performance assessment and reward or aversive feedback.[125 126 127 128]

A number of groups have developed procedures to detect deception based on the P300 (positive @ 300 millisec) event related potential (ERP) from EEG.[129 130 131 132 133 134] A commercial system, Brain Fingerprinting,[135] which includes additional frequency

analysis, and a late negative ERP potential, cites 100% accuracy over five separate studies.[136] [137] [138] [139] [140] Though most EEG deception detection concerns situation specific knowledge, a late positive potential approximate to the P300, is reported to vary as a function of real attitude rather than attitude report.[141]

BRAIN COMPUTER INTERFACES

EEG cortical potentials are detected for both actual movement,[142] and movement readiness potentials (bereitschaftspotential.)[143] [144] EEG sufficiently differentiates just the imagination of movement to operate switches,[145] move a cursor in one[146] or two dimensions,[147] and control prosthesis grasp.[148] EEG detects such potentials to play Pac Man,[149] and imagining the spinning of cubes, or arm raising in appropriate direction guides robots through simulated rooms, [150] [151] [152] both achieved without response prompting. Unprompted slow cortical potentials also can turn on computer programs.[153] Signals from implanted brain electrodes in monkeys achieve even more complex grasping and reaching robot arm control without body arm movement.[154] Some ability to recognize evoked responses to numbers[155] and tones[156] in real time by a commercial system called BrainScope has limited report.

REMOTE AND PROXIMATE BRAIN WAVE CAPTURE METHODS

Contact electrodes with conducive paste typically record EEG, while MEG detectors are in an array slightly removed from the head. Remote detection of brain rhythms by electrical impedance sensors is described.[157] Though non-contact is the only remote descriptor for EEG, this same detector design is applied to monitoring electrocardiogram with wrist sensor location.[158] Passive brain wave fields extend as far as 12 feet from man as detected by a cryogenic antenna.[159] This device is entirely adaptable to clandestine applications, and pointed comments are made on the disappearance of physiological remote sensing literature since the 1970's for animals and humans, while all other categories of remote sensing research greatly expanded.[160]

In 1976, the Malech Patent # 3951134 "Apparatus and method for remotely monitoring and altering brain waves" was granted.[161] Example of operation is at 100 and 210 MHz, which are frequencies penetrating obstruction. [162] "The individual components of the system for monitoring and controlling brain wave activity may be of conventional type commonly employed in radar"; and "The system permits medical diagnosis of patients, inaccessible to physicians, from remote stations" are quotes indicating remote capacity. License is to Dorne & Margolin Inc., but now protection is expired with public domain. The Malech patent utilizes interference of 210 and 100 MHz frequencies resulting in a 110 MHz return signal, which is demodulated to give EEG waveform.

The capability of remote EEG is predicted by electromagnetic scattering theory using ultrashort pulses, [163] which is different from the unpulsed Malech patent. Ultrashort pulses are currently defined in the range of 10^{-12} to 10^{-15} second. Considering that EEG word elicited potentials are comparatively long (hundreds of milliseconds), indicates that remote radar brain wave capture is adequate to word recognition, with ultrashort pulses allowing some 10^{9} or more radar reflections in a millisecond (10^{-3} sec.)

The possibility of impressing an 'experience set' on an individual by ultrashort pulses is also contemplated.[163] The above patent can alter brain waves as well as detect them. Microwave non-lethal weapon brain wave disruption[164] and behavioral change including unconsciousness[165] are known.[166]

THOUGHT READING COVERT DEVELOPMENT EVIDENCE

The research arm of agencies with missions to covertly acquire information would certainly develop to operational capability any thought reading potential, which was reported feasible some 30 years ago to the Department of Advanced Research Projects Agency (DARPA.) Reports that such development has progressed are multiple, and two are confirmed by details of the 1975 DARPA EEG specific word recognition report, which itself is evidence of development covert to open databases.[2] An International Committee of the Red Cross Symposium synopsis states EEG computer mind reading development by Lawrence Pinneo in 1974 at Stanford.[167] A letter by the Department of Defense Assistant General Counsel for Manpower, Health, and Public Affairs, Robert L. Gilliat affirmed brain wave reading by the Advanced Research Projects Agency in 1976,[168] the same year as Malech remote EEG patent grant.

Other assertions affirm each other as to specifics. News articles quote Dr. John Norseen of Lockheed Martin Aeronautics that thought reading is possible and has had development. [169] [170] He predicted by 2005 the deployment of thought reading detectors for profiling terrorists at airports.[170] A further acknowledgement of developing a device to read terrorists' minds at airports was made in a NASA presentation to Northwest Airlines security specialists.[171] Statements in all articles indicate remoteness of brain wave detection, though somewhat proximate.

"Thought reading or synthetic telepathy" communications technology procurement is considered in a 1993 Jane's[g] Special Operations Forces (SOF) article: "One day, SOF commandos may be capable of communicating through thought processes." [172] Descriptive terms are "mental weaponry and psychic warfare" Although contemplated in future context, implied is availability of a technology with limited mobility, since troop deployment anticipation must assume prior development. Victim complaints that mind reading is part of an assault upon them are very similar to such a capacity. Other complaints by these victims, such as technologic internal voice assault are upheld by considerable documentation that internal voice transmission is feasible, even at a distance and within structures,[162] and a presumptive diagnosis of such complaints is largely consistent with microwave exposure[173]--a basis for both internal voice and EEG capture technologies.

DISCUSSION

There is considerable confirmation of an ability to recognize specific concepts by brain activity across subjects. Identifying visual images viewed by a subject solely by measures of mental activity is replicated across three groups by two methods, with best recognition rates of 100%. Three groups report success in visually viewed word identification by brain waves in two methods with best recognition rates of 75%. Isolated

[g] Jane's is the most respected and authoritative of defense reporting services.

groups report EEG word recognition by auditory perception and prior to vocalization, with best results of 100% for auditory perception and 35% for vocalization. Although single reports examine lesser vocabularies, over all open studies of thought recognition, some 80 words have been examined. Word category distinctions would be expected from such individual differences. EEG, MEG, PET, or fMRI techniques discriminate some 42 word class or dimension distinctions, many of which would survive direct comparison just by reported results.

The finding that words can be classified by superposition of sine waves suggests an obvious interpretation, when considering word category blood flow activations of cell assemblies. The frequencies resulting from neuron firing rates in the distributed, yet somewhat discrete regions, when interference phase summed and subtracted by arrival from different locations results in word representation in the brain's language.

Considerable capacity to specifically detect and differentiate mental states is evident from literature reports by EEG. The fact that EEG signals are detected on a voluntary unprompted basis for turning on computer programs,[153] playing Pac Man,[149] and robot guidance[150 151 152] suggests the feasibility of a similar capacity for specific EEG concept recognition. Although most concept recognition work is related to stimulus prompted responses, the detection of numbers, apparently as a class, has limited report.[155] The references to remote EEG provide plausibly exploitable mechanisms, for which covert development has some indication.

The plausibility of thought reading has not completely escaped scientific attention, as a French government panel expresses concern about the potential for thought reading and such a remote capacity.[174] Complete rejection of reports of a remote mind reading capability is just as presumptuous, in the face of complaints, as has been the dismissal of internal voice capacity.[162] News reports of covert thought reading development have confirmation in the Pinneo study, and independent assertions of proximate thought reading development "against terrorists" affirm each other. Special operations officials consider procurement of a similar remote capacity to that of which many victims complain. Though victims will regard their experience to affirm such a thought reading capability, professional prejudice regards such complaints as defining psychiatric condition. The certain fact is that these claims have no adequate investigation, which given available evidence is a rather egregious violation of personal dignity. Presumption of mind reading development must at least be considered as plausible, even regarding very remote methods.

It is known that government elements have done work in thought reading development. The logic that in the 30 years since the Pinneo work started, this capacity is operationally applied is too sound to dismiss victim corroboration and other evidence, without appropriate investigation. It would have to be admitted that funding for projects by the defense and security agencies is considerably greater than for open science, and that thought reading would be a priority area. Particularly disturbing is the existence of a remote EEG method in the public domain. Educated democracies should not be complacent at any prospect of mind reading, given the potential for privacy loss, civil rights violation, and political control.

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Pinneo LR and Hall DJ. "Feasibility Study for Design of a Biocybernetic Communication System" is available from Christians Against Mental Slavery at info@slavery.org.uk.

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