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Corpus Callosum of the Global Brain?

Locating the integrative function within the world wide web

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Introduction

The [global brain](#) is a conceptualization of the worldwide network formed by all the people on this planet together with the information and communication technologies that connect them into an intelligent, self-organizing system. The term was coined by [Peter Russell](#) (*The Global Brain: speculations on the evolutionary leap to planetary consciousness*, 1982).

The original metaphor was first presented as a model by [Francis Heylighen](#) and [Johan Bollen](#) (*The World-Wide Web as a Super-Brain: from metaphor to model*, 1996). Heylighen reviewed the history of the underlying ideas in terms of four perspectives "organicism", "encyclopedism", "emergentism" and "evolutionary cybernetics" (*Conceptions of a Global Brain: an historical review*, 2011). A basis for simulating the operation of the brain in terms of the connectivity of its elements has been suggested in terms of the thousands of interlinked online profiles of the *Yearbook of International Organizations* and the *Encyclopedia of World Problems and Human Potential* (*Simulating a Global Brain: using networks of international organizations, world problems, strategies, and values*, 2001).

Exploiting the metaphor, rather than the model, the concern here is the nature and location of the integrative function within the world wide web. This follows from questions raised with regard to integration of the right and left hemispheres of that brain, however these are to be understood (*Engendering Viable Global Futures through Hemispheric Integration: a radical challenge to individual imagination*, 2014)

It is appropriate to ask whether the current challenges to global governance, and any requisite integration of the global brain, could not be fruitfully explored with respect to [split-brain](#) pathology, any form of split consciousness, [hemispheric specialization](#), or bipolar disorder. "Hemisphere" is also a reminder of its metaphorical appropriation from the potentially complex patterns of geometry -- rarely explored in relation to globality (*Metaphorical Geometry in Quest of Globality -- in response to global governance challenges*, 2009). Ironically, with respect to the argument here, "hemispheric disassociation" is only too evident between the cybernetic preoccupation with the global brain (as modelled by the internet) and its use as a metaphor for emergence of planetary consciousness.

With respect to strategic vision, the requirement for separate hemispheres to achieve stereoscopic depth could also be understood as a challenge to implicit assumptions regarding any "cyclopean" form of globality (*Cyclopean Vision versus Poly-sensual Engagement*, 2006). Such integrative implications are also evoked with respect to political economy (Diego Sánchez-Ancochea and Kenneth C. Shadlen, *The Political Economy of Hemispheric Integration: responding to globalization in the Americas*, 2008; Maxwell Cameron, *The Future of Hemispheric Integration*, *The Mark*, 7 March 2012). These currently play out with respect to the [Trans-Pacific Partnership](#) (TPP) and the [Transatlantic Trade and Investment Partnership](#) (TTIP) .

Corpus callosum of the global brain?

Literature on the global brain as a model tends to avoid reference to the hemispheric integration, better framed through the metaphor of a global brain. Chris Woodford, for example, makes only the briefest of reference to the role of the *corpus callosum* (*The Internet and the Brain, Explain that Stuff*, 2014). As noted by *Wikipedia*:

The *corpus callosum* (from Latin: "tough body"), also known as the callosal [commissure](#), is a wide, flat bundle of neural fibers beneath the [cortex](#) in the [eutherian brain](#) at the [longitudinal fissure](#). It connects the left and right [cerebral hemispheres](#) and facilitates interhemispheric communication. It is the largest [white matter](#) structure in the brain, consisting of 200-250 million

[contralateral axonal](#) projections.

Each hemisphere is divided into regions called lobes, understood to play different roles with respect to human behaviour. With respect to [hemispheric specialization](#), the [lobes of the brain](#) are variously distinguished as numbering four, six and eight. The cerebral cortex is divided up into four lobes, however, more specifically, each lobe has a right and left side, making eight. They include:

- [Frontal lobe](#): conscious thought; damage can result in mood changes, social differences, etc. The frontal lobes are the most uniquely human of all the brain structures.
- [Parietal lobe](#): plays important roles in integrating sensory information from various senses, and in the manipulation of objects; portions of the parietal lobe are involved with [visuospatial processing](#)
- [Occipital lobe](#): sense of sight; lesions can produce hallucinations
- [Temporal lobe](#): senses of smell and sound, as well as processing of complex stimuli like faces and scenes.
- [Limbic lobe](#): emotion, memory
- [Insular cortex](#): pain, some other senses.

It might be asked what "lobes" are distinguished from a cybernetic understanding of the operation of the world wide web -- given the importance of the above functions with respect to collective consciousness. Some specific consideration of an analogue to the *corpus callosum* is given by Takeshi Utsumi ([Quest for Global Peace](#), *International Journal of Humanities and Peace*, 17, 2001, 1) in terms of a "Rainbow Bridge Across the Pacific".

What seems to be extraordinary, given the problematic integrative function of the world wide web, is the lack of attention to the extensive work by neuroscience on any dysfunction of the *corpus callosum* or indeed to its absence (J. Michael Tyszka1, et al, [Intact Bilateral Resting-State Networks in the Absence of the Corpus Callosum](#), *The Journal of Neuroscience*, 2011; Audrey Benezit, [Organising white matter in a brain without corpus callosum fibres](#), *Cortex*, 09/2014). Such absence, known as [corpus callosum dysgenesis](#) (CCD), might well characterize global civilization at this time.

A valuable question is raised by [Michael S. Gazzaniga](#) ([Cerebral specialization and interhemispheric communication: does the corpus callosum enable the human condition?](#) *Brain*, 2000,; reviewed by Patricia Ann Reuter-Lorenz, *The Cognitive Neuroscience of Mind: a tribute to Michael S. Gazzaniga*, 2010). He frames the question as follows:

When this is considered in the light of new studies on the lateralization of functions, it becomes reasonable to suppose that the *corpus callosum* has enabled the development of the many specialized systems by allowing the reworking of existing cortical areas while preserving existing functions. Thus, while language emerged in the left hemisphere at the cost of pre-existing perceptual systems, the critical features of the bilaterally present perceptual system were spared in the opposite half-brain. By having the callosum serve as the great communication link between redundant systems, a pre-existing system could be jettisoned as new functions as new functions developed in one hemisphere, while the other hemisphere could continue to perform the previous functions for both perceptual and cognitive processes, the lateralization of half-brains.

If global civilization is vulnerable to crisis, as seems only too evident, what effort is made to learn from the neurosciences as a consequence of any injury? This is explored, in the case of the brain, by David J. Sharp, Gregory Scott and Robert Leech ([Network Dysfunction after Traumatic Brain Injury](#), *Nature Reviews Neurology*, 2014). Arguably their perspective with regard to [traumatic brain injury](#) (TBI) is highly relevant to any understanding of the consciousness of global civilization at this time:

Damage to the structural connectivity of these networks produces predictable abnormalities of network function and cognitive control. For example, the brain normally shows a 'small-world architecture' that is optimized for information processing, but TBI shifts network function away from this organization. The effects of TBI on network function are likely to be complex, and we discuss how advanced approaches to modelling brain dynamics can provide insights into the network dysfunction.

Given the much-challenged present capacity to learn from history, any form of collective TBI could be related to effects on collective memory, as separately argued ([Societal Learning and the Erosion of Collective Memory](#), 1980; [Pointers to the Pathology of Collective Memory](#), 1980).

Imagining an integrative function within the world wide web

From the perspective of cybernetics and connectivity basic to any model of information transfers within the world wide web, various ways of understanding "integration" can be envisaged with respect to the internet:

- [Submarine communication cables between continents](#), as the first level of connectivity between continents
- [Internet backbone](#), understood as the principal data routes between large, strategically interconnected computer networks and core routers on the Internet.
- [Root name servers](#) of the Internet, namely the set of name servers for the [root zone](#) of the [Domain Name System](#) of the Internet. These respond to requests for records in the root zone and answer other requests by returning a list of the [authoritative name servers](#) for the appropriate [top-level domain](#) (TLD). It might be asked whether the TLDs distinguished correspond to any degree, in functional terms, to the lobes of the brain -- possibly indicative of belief systems.
- [Dominant search engines](#), especially those such as Google providing access to the world wide web.
- Emergence of a [semantic web](#), currently understood as a collaborative movement led by the World Wide Web Consortium. This

promotes common data formats by encouraging inclusion of semantic content in web pages. The intention is to convert the current web, dominated by unstructured and semi-structured documents, into a "web of data".

- Server complexes registering all internet transactions, as with the NSA [Intelligence Community Comprehensive National Cybersecurity Initiative Data Center](#) (Bluffdale, Utah)
- Simulations of an integrative function, as with:
 - the [Sentient World Simulation](#) (SWS), intended as a "synthetic mirror of the real world with automated continuous calibration with respect to current real-world information" with a node representing "every man, woman and child"
 - the [FuturICT Knowledge Accelerator](#), a multidisciplinary international scientific endeavour with focus on techno-socio-economic-environmental systems.
- Initiatives such as the [Global Futures Intelligence System](#) (of the [Millennium Project](#)), the [Global Brain Institute](#), the [Global Consciousness Project](#), or the [Global Sensemaking](#) network

Clearly these variously perform, or imply, a vital integrative function which provides a focus for particular kinds of studies of integration, most notably from the perspective of control systems and cybernetics. It is according to such understanding that forms of artificial intelligence, embedded within such systems, that planetary consciousness can be held to emerge

Readily held to correspond to only one of the hemispheres of the human brain according to current understandings of [lateralization of brain function](#). The question is how this set of functions relates to integration as a whole -- more "integratively" understood. Whilst the subject of nuance and controversy, the functions distinguished are:

- Language functions such as grammar, vocabulary and literal meaning are typically lateralized to the left hemisphere
- Visual and auditory stimuli, spatial manipulation, facial perception, and artistic ability are represented bilaterally, but may show a right hemisphere superiority.

With respect to information on the world wide web, clearly both forms of information are currently transferred to various degrees. This can be understood as a "plumbing" function. There is far greater ease to the transfer of those associated with language. Clearly transfer of the second is also represented to a degree within some contexts but -- most notably -- not with respect to academic discourse regarding the world wide web itself. Academic journals are unable to handle information of the second kind, for example.

Of concern is the manner in which reflection governed by each hemisphere tends to appropriate the integrative insights of the other. Whilst deprecating the incapacities of the other, there is a degree of failure to recognize its particular capacities. In this process, the nature of any potentially emergent integration gets obscured, as variously discussed (*From Information Highways to Songlines of the Noosphere: global configuration of hypertext pathways as a prerequisite for meaningful collective transformation*, 1996).

Nature of meaningful integration within the global brain

Depth perception? More significant to the argument here is then the question of what constitutes "integration". There is no question that a significant degree of integration occurs with respect to the "plumbing" of the internet (and the tangibles it conveys). This can be represented on remarkable maps -- possibly even featuring the transactions dynamically. Far less clear is any form of integration relating to the intangibles of meaning and semantic content, however the integration of this might be understood. How might constraints on such integration inhibit depth perception vital to collective human survival, as variously suggested (A. Ptito, et al, *Localization and lateralization of stereoscopic processing in the human brain*, *Neuroreport*, 10, 1993, pp. 1155-8; Ian P. Howard and Brian J. Rogers, *Perceiving in Depth*, 2012)

Mapping? It is significant, for example, that Google only offers a list of search results in response to queries. This can only be understood as an integrative response to the extent that a succession of queries may suggest an integrative perspective -- but only to be inferred from what is actually provided. The answers provided to a search query are not in themselves integrative, and no claim is made in that regard. There is no effort to integrate the results into a map of any kind: a [semantic map](#), a [concept map](#), a [conceptual graph](#), a [cognitive map](#), a [mind map](#), a [knowledge integration map](#), or a [topic map](#). Integration might however be reframed by considering processes such as [profiling for marketing and security purposes](#), and trend analysis (as with [Google Trends](#)). Do these constitute what can be best understood as integration within the global brain at this time?

Although isolated explorations of such mapping are made, these must necessarily be understood as precursors of the integration required of a global brain -- as explored more systematically in the above-mentioned online simulation (*Simulating a Global Brain: using networks of international organizations, world problems, strategies, and values*, 2001). Given the implied dependence on computerization and artificial intelligence, the nature of integration might also be explored in terms of the capacity to respond to the more fundamental questions of a global civilization in crisis (*Superquestions for Supercomputers: avoiding terra flops from misguided dependence on teraflops?* 2010).

Relevance to a global civilization in crisis? Missing from such understanding, and the associated endeavours, is any sense of the kind of emergent integrative function that might be expected as a consequence of hemispheric integration. Describing and redesigning the "plumbing" may well be the remarkable role of one hemisphere. Envisioning the nature of [planetary consciousness](#), or [global consciousness](#), through the arts and otherwise, may be the function of the other. How any viable integration of relevance to a global civilization in crisis is to emerge is a matter of a quite different order.

Given the distinction made between the lobes of the human brain and their functions, how might this be reflected in the future integration of the global brain? Are the disparate understandings of global brain distinguished above by Heylighen ("*organicism*", "*encyclopedism*", "*emergentism*" and "*evolutionary cybernetics*") to be understood as associated with different lobes?

Objectivity 8 Subjectivity? More challenging is the sense in which lateralization of the brain could be understood as related to the

processing of objectivity relative to that of subjectivity -- with the latter associated with imagining, dreaming and reframing in ways which are antithetical to the former. There is clearly a degree of paradox to this process and to the manner in which they might then be integrated, as discussed separately (*Defining the objective ∞ Refining the subjective ?!: Explaining reality ∞ Embodying realization*, 2011).

Use of the infinity symbol offers a sense of a form of "cognitive twist" required in order to achieve integration between the subjective and the objective -- through which the world is effectively turned "inside out", as separately discussed (*Sphere eversion as guide to the cognitive twist of global introversion?* 2013). The symbol, in the form of the Möbius strip is fundamental to a related argument by Steven M. Rosen (*The Moebius Seed: a visionary novel of planetary transformation*, 1985). The latter concludes by exploring the integrative potential of a global computer conference (a "Creative Visions Conference"). This depicts how the cumulative cyber-input of various holistic ideas, images, and sounds -- originating from both the sciences and arts -- finally triggers a radically non-linear shift resulting in the emergence of forms of harmony that herald the birth of a "planetary organism".

Meta-pattern of connectivity? One approach to the nature of such an integrative function is to recognize it as associated with a connecting meta-pattern. This would follow from the argument of biologist Gregory Bateson (*Mind and Nature; a necessary unity*, 1979, pp. 8-11).

The pattern which connects is a meta-pattern. It is a pattern of patterns. It is that meta-pattern which defines the vast generalization that, indeed, it is patterns which connect. And it is in this from this perspective that he warns: Break the pattern which connects the items of learning and you necessarily destroy all quality.

With respect to the role of aesthetics and the arts, in explaining why "we are our own metaphor", Bateson pointed out to a conference on the effects of conscious purpose on human adaptation that:

One reason why poetry is important for finding out about the world is because in poetry a set of relationships get mapped onto a level of diversity in us that we don't ordinarily have access to. We bring it out in poetry. We can give to each other in poetry the access to a set of relationships in the other person and in the world that we're not usually conscious of in ourselves. So we need poetry as knowledge about the world and about ourselves, because of this mapping from complexity to complexity. (Mary Catherine Bateson. *Our Own Metaphor*, 1972, pp. 288-289).

It is ironic to note that the elusive sense of the requisite integration is associated with the proverbial elephant in the living room (*Strategic Challenge of Polysensorial Knowledge: bringing the "elephant" into "focus"*, 2008). The challenge is variously recognized and argued:

- Paul Bailey: *Think of an Elephant: combining science and spirituality for a better life* (2007)
- George Lakoff: *Don't Think of an Elephant!: Know Your Values and Frame the Debate* (2014)
- Donald N. Michael: *In Search of the Missing Elephant: Selected essays* (2010)

Metaphor as the integrative function of the global brain?

The argument above frames the question as to what kind of information would perform an integrative function within the global brain -- understood as relating the forms of information characteristic of each hemisphere.

Inter-, Trans-, And? A prime candidate could have been what might have emerged from preoccupation with [interdisciplinarity](#) or [transdisciplinarity](#) -- on the assumption that the disciplines so related would include those characteristic of both hemispheres, namely the arts and the sciences. There is little trace of a viable integrative function resulting from such preoccupation. More concretely might have been initiatives deliberately combining the arts and sciences. Examples include the [American Academy of Arts and Sciences](#) (AAAS) and the [World Academy of Art and Science](#) (WAAS). Again, few would claim that such exclusive bodies perform a vital integrative function.

In practice, use of "inter", "multi", "cross" or "trans" tends to be meaningful only with respect to declared intentional and public relations. There is indeed a degree of cross-fertilization resulting from juxtaposition. Hence the use of "and" in relating art and science. It is a matter of debate as to whether this constitutes fruitful integration, especially when the arts are used only to "decorate" the activities of the sciences and offer symbols of their elegance and appeal. Juxtaposition is not sufficient for integration -- as delightfully implied by the German compound term *Buchbindersynthese* with respect to interdisciplinary volumes. The contrast is evident in the acclaimed initiatives of György Kepes through the [Center for Advanced Visual Studies](#) in integrating art and technology (*Structure in Art and in Science*, 1965). That between science and religion is less evident.

It would seem that some such possibility is being explored otherwise as "[joined-up thinking](#)" (Rick Lewis, *Joined-up Thinking, Philosophy Now*, Nov/Dec 2014; Chris Frith, *Neuroscience: Joined-up thinking, Nature*, 2014; Philip Delves Broughton, *Joined-up thinking, Financial Times*, 8 June 2011; *Joined-up Thinking, Lloyd's News*, 1 December 2014; *EU development policy needs joined-up thinking, say MEPs, European Parliament News*, 25 October 2012). How is this form of integrative thinking enabled within the world wide web?

Metaphor: The question is what is the special form of language that enables movement between the cognitive functions performed by the hemispheres of the global brain? Following Bateson, one interesting candidate is metaphor, given the manner in which it can reframe the preoccupations of each for the other -- offering a degree of comprehensibility, communicability and credibility where other devices fail, with the additional advantage of memorability.

The argument has been developed from another perspective (*Metaphors as Transdisciplinary Vehicles of the Future*, 1991). With respect

to the focus of WAAS, for example, and following the argument of Bateson with regard to poetry, metaphor can be used to reframe strategic preoccupations (*Ensuring Strategic Resilience through Haiku Patterns: reframing the scope of the "martial arts" in response to strategic threats*, 2006).

Cognitive psychology and bioculture: A more powerful case has been made from the perspective of cognitive psychology by George Lakoff and Mark Johnson (*Metaphors We Live By*, 1980/2003). In the light of the distinction between Eastern and Western hemispheres, it is useful to note how this was extended by those authors in a manner which raises useful questions as to the nature of the "flesh" of the global brain and any embodiment of the global mind (*Philosophy In The Flesh: the embodied mind and its challenge to western thought*, 1999) -- and separately discussed (*Enhancing the Quality of Knowing through Integration of East-West metaphors*, 2000).

Also of relevance, in the light of neuroanatomy and neuropsychology, is the association of the development of the various lobes of the brain with emergence of particular cultures and intelligence systems (Maria M. Colavito, *Why Study Humanities? The Biocultural Mandate*, 1999; Antonio de Nicolas, *The Biocultural Paradigm: the neural connection between science and mysticism*, *Journal of Experimental Gerontology*, 33, 1998, 1/2). This paradigm shows that biology and culture act on one another as the conditioning parameters of neurocultural information. Through mutual interaction biology in humans becomes culture, and vice versa, culture opens and stimulates the neural passages of the brains, accounting thus for the varieties of brains in humans, and for cultural diversity.

What is the number of the global brain? In her consideration of the insights of mathematician Georg Cantor with respect to transfinite sets, Sarah Voss framed a question which could be asked of the integrity of the global brain (*What Number is God?, Metaphysics, metamathematics, and the nature of things*, 1995). Rather than any simple understanding of the oneness of the global brain, such a question could highlight other ways of understanding its nature and that of any integrative function. Voss considers the use of transfinite numbers as a way of understanding the infinity with which God is frequently associated. Such an association was an early inspiration for Cantor (Joseph W. Dauben, *Georg Cantor and Pope Leo XIII: mathematics, theology, and the infinite*, *Journal of the History of Ideas*, 1977).

Contrasting understandings of number, potentially relevant to a more appropriate understanding of the integrity of the global brain, include: zero, negative numbers, rational numbers, real numbers, complex numbers, hypercomplex numbers, hyperreal numbers, transfinite numbers, and transcendental numbers. With respect to that integrative function, such possibilities suggest another way of considering the alleged assertion of Pythagoras: *All is number*. If the all-encompassing global brain is to be considered a form of surrogate for deity by some, use can also be made of the argument of Stephen Prothero (*God Is Not One: the eight rival religions that run the world -- and why their differences matter*, 2011). If the global brain is not singular, what indeed are the "eight" rival functions to be held as ruling the world -- and why might their differences matter?

Given the characteristic association of mathematics with one hemisphere, of further interest is the role of metaphor in mathematics (George Lakoff and Rafael Núñez, *Where Mathematics Comes From: how the embodied mind brings mathematics into being*, 2000). The authors aim to lay the foundations for a truly scientific understanding of mathematics, one grounded in processes common to all human cognition. They find that four distinct but related processes structure basic arithmetic metaphorically: object collection, object construction, using a measuring stick, and moving along a path. Criticism of their endeavour could be fruitfully explored as consistent with bias characteristic of particular lobes. Part of the difficulty for mathematics is that it is itself highly fragmented -- it is "not one" -- despite the efforts of meta-mathematics. Nor does it benefit from much effort to elicit a degree of overarching order commensurate with the richness of its parts, as tentatively explored (*Is the House of Mathematics in Order? Are there vital insights from its design*, 2000).

With respect to the quest for the integrative function of the global brain, there is some irony to the manner in which such distinctions are recognized -- in the light of distinctions made with regard to the number of lobes of the brain. As noted above, these are variously distinguished as 2 (hemispheres), 4, 6 and 8. This recalls the cheerleader chant: 2, 4, 6, 8; *who do we appreciate?* Missing from such denumeration is the linking function provided by the corpus callosum -- as the third, the fifth, the seventh, or the ninth?. This recalls the much-cited study by George Miller (*The Magical Number Seven, Plus or Minus Two: some limits on our capacity for processing information*, *Psychological Review*, 1956).

Lobotomy and corpus callostomy of the global brain? Cutting the connection between lobes and hemispheres constitute forms of psychosurgery to alleviate mental disorder. Between the frontal lobes, this is the controversial practice termed lobotomy. Cutting the corpus callosum, through corpus callostomy, endeavours to prevent the spread of interhemispheric epileptic seizures along that pathway. In addition to seizure reduction, behavior and quality of life may improve.

The arguments for these procedures in response to severe mental disorder suggest valuable questions with respect to disorders of the global brain and its integrative functions. It is not difficult to recognize analogues to the tragic behavioural crises of global civilization, readily to be compared to occasional epileptic seizure. The argument can be taken further through exploring the possibility that civilization is already a victim of a form of self-inflicted lobotomisation -- potentially indicated by the dysfunctionality of the "and" process in any token juxtaposition of art and science, for example. The point was strongly made by C. P. Snow (*The Two Cultures and the Scientific Revolution*, 1961). Does the global brain have a propensity to extreme self-harm?

Is the very activity of the sciences or the humanities, as formally recognized, dependent on a process of cognitive disassociation which could be framed metaphorically as corpus callostomy? Can the political slogan, *There Is No Alternative* (TINA), as framed by Margaret Thatcher, be understood as a form of lobotomy through which hemispheres are separated? The TINA mindset is frequently cited as an inherently dysfunctional symptom by social change advocates.

Of related relevance as a metaphor is agenesis of the corpus callosum, namely the condition in which that structure is partly or completely missing, severely limiting integration of left-brain and right-brain function.

Metaphorical capacity and the corpus callosum: Citing L. B. N. Hinkley (*The Role of Corpus Callosum Development in Functional Connectivity and Cognitive Processing*, *PLoS ONE*, 2012), the argument is supported otherwise by brain science, as presented by

Cittoor Girija Navaneedhan and T. J. Kamalanabhan (*Metaphorical Thinking and Information Processing Ability, Journal of Behavioral and Brain Science*, 2014), arguing that:

Practice of metaphorical thinking in understanding given information promotes the communication of the two hemispheres by a bundle of connecting fibres, the corpus callosum at neo cortex level and through hippocampus at the level of limbic system. Hence, metaphorical thinking helps learners to make connections and develop patterns and relationships in parallel to the language as well as symbols relevant to the given information.

War and metaphor: Warfare, whether metaphorical or otherwise, could be understood as eliciting a curious form of integrative function between the hemispheres -- possibly framed by enabling metaphor, as variously argued by George Lakoff (*Metaphor and War, Again, AlterNet*, 17 March 2003; *Obama Reframes Syria: Metaphor and War Revisited, The Huffington Post*, 9 June 2013) and by others (Noriko Iwamoto, *Constructing Reality through Metaphorizing Processes in Wartime Reporting*, 1996). The recognized relevance of metaphor to national security is made apparent by the launch of a major new programme -- [The Metaphor Program](#) of the US [Intelligence Advanced Research Projects Activity](#) (Alexis Madrigal, *Why Are Spy Researchers Building a 'Metaphor Program'?*, *The Atlantic*, 25 May 2011). A significant participant is the [US Army Research Laboratory](#) -- slogan: *Technology Driven - Warfighter Focused*.

Alternation? How then to imagine the sustaining metaphors of a global brain? Given the requisite degree of communication between the hemispheres implied by any integrating function, one approach is in terms of alternation, as separately discussed (*Metaphors of Alternation: an exploration of their significance for development policy-making*, 1984).

Whether such integration is associated with an analogue to the *corpus callosum*, or is to be understood otherwise, there is clearly a case for the exploration of the meaning of integration in that respect. Given issues of [non-locality](#), where and how it might be understood to be "located" also merits consideration.

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