

**Social Organization as Applied Neurobiology:
The Value of Stories and Story Sharing**

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Abstract. Based on observations in biology and neurobiology, as well as in educational and small social group contexts, it is suggested that effective social organizations should have a distributed, interactive character as an alternative to hierarchical or anarchistic structures. A key element in such organizations is an ongoing individual and collective process of story creation, sharing, and revising. The argument made here both draws from experiences with interdisciplinary activity and situates it in a wider context, one in which the architecture and potential of the human brain plays a key role

Imagine a group of geese flying across the sky. One goose is in front, and the others successively further behind on each side in a v-formation. Many people's intuition is that the front bird is the leader, a distinctive goose who has special characteristics that it uses to keep the other geese in line. A presumption that collective organization like the v-formation depends on a leader in the sense just described, on a hierarchical organization (see Figure 1a), seems deeply engrained in human thought.

Now imagine a group of state representatives to a national constitutional convention. Each harbors to one degree or another a conviction that they themselves are the best judge of the potentials and needs of the state they represent, and fears their state will be disadvantaged by any centralized authority. An inclination to resist hierarchical organization is perhaps as engrained in humans as is the presumption it must exist.

In this essay, I aim to unsettle the notion that a hierarchical organization of the sort presumed in the case of flying geese (or feared in the case of the constitutional convention) is either desirable or inevitable. And to unsettle as well the idea that the only alternative to such a hierarchical organization is a feared or fancied anarchy (or unbridled "relativism", Grobstein, 2005b). The most common and most successful organizations known, those typical of the biological world, are in general neither hierarchical nor anarchistic but involve instead what I will call distributed interactive architectures (Figure 1c). And the human brain itself displays a multilevel version of such an architecture (Figure 1d) that I will argue provides an exemplary model for human social organization in a wide variety of circumstances.

In making this argument, I will draw not only on biological and neurobiological observations but also on my own experiences in the social arena, particularly but not exclusively seven years as director of the interdisciplinary Center for Science in Society at Bryn Mawr College. The Center was founded to promote "the broad conversations ... which are essential to continuing exploration of ... the natural world and humanity's place in it." (Center for Science in Society, n.d.). Hence, the arguments I will present here should be treated as a summary of empirical observations and, moreover, empirical observations made in a particular context. They are therefore no more (and no less) than an interim report of work in progress, and of value insofar as they are useful to others in

their own explorations and open new directions in my own. While any such usefulness might on the face of it seem to be restricted to “academic” social organizations, I will describe reasons to believe this is not in fact the case: that social organizations patterned after human brain architecture are not only possible but highly desirable in a wide array of human contexts, that their ability to facilitate “broad conversations” is a needed mechanism to address a diverse array of human problems and challenges.

Distributed Interactive Architectures

A major general insight of twentieth and early twenty-first century science is that collective and highly adaptive organization can result from interactions among entities none of which function as a leader (Resnick, 1994; Johnson, 2001; Keller, 2003; Dalke et. al, 2007, Grobstein, 2008). Flocking behaviors in birds and other organisms can be accounted for in terms of interactions among individuals all of whom are equivalent and follow the same internal instructions. The same is true of, for example, task allocation in ant colonies and synchronization of flashing displays in some species of fireflies. Humans are by no means unusual in this regard. The “wave” displayed by audiences at many sporting events reflects a collective order created by individuals all following the same internal instructions (get up after people to your left get up, then sit down), and there are a variety of more ordinary social and economic phenomena where collective organization seems to have a similar “emergent” character (Gladwell, 2000). Indeed, Adam Smith’s “invisible hand”, the core of modern capitalist economics, is appropriately thought of as coordinated collective behavior in the absence of a leader.

What is particularly germane in the present context is that “leaderless” organization, reflecting distributed interactive architectures, seems to be very much the norm rather than the exception in biological systems generally, at all levels of organization from the social to the molecular. DNA, to take one example, is increasingly understood to be not the “organizer” or “blueprint” of living organisms but rather a particular molecular array that interacts with a variety of other molecular in such a way that particular organisms “emerge”. Similarly, neither the heart nor the brain is the “leader” of a multicellular organism like a human; instead each of them interacts with each other and a variety of other entities to yield the phenomenon we call life. The same holds for the brain itself; it consists of a larger number of interacting regions that create, for example, the picture we see when we look at the world, and consciousness itself (Grobstein, 2003a, 2005c).

These examples differ from the simpler forms of collective order involved in flocking, ant colonies, and the like, in that the interacting elements are heterogeneous rather than indistinguishable. At the same time, they share with them the essential characteristics of distributed interactive architectures (Figure 2c):

1. No element is “in control”, instead each is influenced by and in turn influences other elements. Causal relationships are bi-directional rather than one way.
2. No element has complete information about the function of the assembly as a whole; instead each element acts in terms of partial information and its own organization, sharing information about its own activity with other elements.

3. No element represents an “objective” for the assembly as a whole; instead the appearance of an overall “objective” exists only for an observer and reflects simply the semi-independent activities of the elements as modified by their patterns of information sharing.

The characteristic that distinguishes between these systems and anarchistic ones (Figure 2b) is not the presence of a leader but rather their extensive and reciprocal interconnections. That distributed interactive architectures, rather than hierarchical organization, is the norm in the biological world raises some very interesting questions about why humans tend to presume that organization depends on a leader. Perhaps more importantly, it suggests that the presumption needs serious re-examination. Biological systems are themselves the product of evolution, of billions of years of trial and error in which more effective organizations persist while less effective ones disappear. It's hard to escape the conclusion from biology that by and large systems involving distributed interactive architectures work better than hierarchical ones in the kinds of continually, somewhat unpredictably changing environments to which evolution has been responding.

Multi-level architectures having story tellers

A significant and, in evolutionary terms, apparently quite recent variant of distributed interactive architectures is exemplified by the human brain (and probably that of most mammals). As illustrated in the lower part of Figure 2, the human nervous system consists for the most part of a large number of relatively specialized modules that interact with the outside world and display some significant collective coordination due to the kind of information sharing that characterizes distributed interactive architectures in general. Like other instances of such organizations, the assembly appears to an external observer to have “objectives,” without in fact having any such thing explicitly represented in any single element of the assembly, each of which functions in terms of local information and organization.

There is, of course, a potential disjunction between such a characterization of the human brain and the experiences one has of a distinctive and unitary self who is both coherent and has objectives. Some people are more aware of their internal multiplicity (what Marvin Minsky termed “the society of mind” (Minsky, 1986)). Others are less so, for at least two reasons. One is that the various specialized modules for the most part do not produce conscious experiences. They also have under most circumstances relatively compatible internal organizations and are relatively good at exchanging information in ways that result in a quite good coordination among them without any of their activities yielding substantial conscious awareness. The other, more important for present purposes, is that the human brain includes as well a second architectural layer (the “neocortex”; Figure 2) that has been designed (by evolution) to try and achieve a single, coherent “story” of the collective entity that consists of itself and the rest of the nervous system. This “story” is one’s conscious experience, one’s description of oneself and one’s relation to the world, including one’s sense of objectives and of alternatives that might be pursued to achieve them (Grobstein 2003, 2005c, 2008).

Because of this “bipartite” brain organization, we are largely unaware of the collective that gives rise both to our own behavior and to our experiences both of ourselves and of the world around us. It is perhaps also because of this bipartite brain organization that we tend to presume hierarchical organizations involving leaders as the norm. What we are aware of is a more or less coherent self, who is (or is supposed to be) “in charge” of what we do and expects it to be done in line with its own “objectives”.

In fact, our conscious selves are, as many people experience to varying degrees, rarely “in control” to the extent they think they are (cf Kolata, 2007). And in many circumstances, they are a less effective guide to behavior than is the unconscious community with which they interact (cf. Gladwell, 2005). To put it differently, the story telling part of the brain doesn’t function as a hierarchical leader but rather as an additional element of a distributed interactive architecture, with our behavior reflecting sometimes one, sometimes another of the diverse elements that make up the brain, and most often interactions among them,

There are though several important differences between the story telling element and others of the elements with which it interacts. The most obvious is an architectural feature illustrated in Figure 2: the story telling element does not have any direct connections with the outside world. It receives information about things outside the nervous system (both the world and the rest of the body) only from other elements of the nervous system and acts on things outside the nervous system only through them. It is, in this sense, an upper level element, strictly dependent on the other elements for interactions with things outside the nervous system. While other elements interact with and are modified by interactions with things outside, the story teller interacts with and is modified only the interactions with things inside the nervous system.

A second important feature of the architectural arrangement, as illustrated in Figure 2, is that the conscious/story telling element receives continuous convergent information from the array of other elements of the “society of mind”, reporting not only their activity but the analyses they have made of the local information they have. These constitute feelings, intuition, emotions and the like. It is from these inputs that the upper level element creates its “stories”, coherent ways of making sense of the cacophony of signals it gets from other elements of the society of mind. Just as the lower level elements work to make sense of aspects of the body and world to achieve particular objectives, so does the story teller work to make sense of the array of signals it gets from the society of the mind.

It is the existence of this upper level story generating capability, itself dependent on a multi-level architecture, that gives the human brain capacities that extend beyond those of simpler distributed interactive architectures. The “story” is at any given time, and with varying degrees of consensus, a representation of the assembly as a whole, of an “objective” that can in turn be used to assess the performance of the assembly as a whole. The “story”, redistributed through the assembly, is also a way to suggest modifications in the performance of parts, based on a wider array of information than is available at any given time to any given part. Most importantly, perhaps, the story is phrased in more

abstract and general terms that allow for its ready modification by imagining simple “what if’s?”. The upshot is that “story” becomes itself a significant influence on the behavior of an organism, as does the capability to conceive and try out things that have not yet existed. The brain is an interactive distributed system, but one that represents itself and the world not only as it has experienced them but also as they might conceivably be, in terms of “objectives.”

Such a system has superficial similarities to a hierarchical system (compare Figures 1a and 1d), but is in fact quite different. The story teller (or “fuschia dot” in Figure 1d) has no more power or authority than the rest of the elements of the community of mind. Its “upper level” character is entirely an architectural feature; it is a generalist whose capabilities depend on the inputs it gets from more specialized systems and whose effectiveness depends entirely on its ability to create from them stories that they can accept and work with. Its stories are neither inevitable nor “true” (Grobstein, 2004, 2005a, 2008) but simply a potentially useful addition to the possibilities available to the community of mind as a whole. The organization is neither that of a hierarchy with a leader nor anarchy but rather one in which there is continuing report and negotiation with some elements focused on more specialized tasks and associated processes of information gathering, synthesis, evaluation, and creation related to them, and others (the “fuschia dots”) on similar tasks of information gathering, synthesis, evaluation, and creation operating over wider terrains.

**From the brain to social organization:
Interdisciplinary conversation and academic structures**

It is probably not coincidence that the picture of brain architecture described in the preceding section emerged in my own brain during a period when I was also engaged in active exploration of academic structures that would provide greater support and encouragement for interdisciplinary conversations. Anyone having experience with modern academic institutions will recognize their tendency to organize around disciplines, ie around focused and specialized engagement with relatively narrow processes of information gathering, synthesis, evaluation, and creation. And to resist, both intellectually and politically, efforts to work and make common cause over broader terrains. In so doing, they appeal to arguments not unlike those used in constitutional conventions, substituting disciplines for “states rights” and interdisciplinary for “federalism.”

My own instincts as a scientist and intellectual have always been otherwise (Grobstein, 2008), and it was for this reason that I became involved in the creation of the interdisciplinary Center for Science in Society at Bryn Mawr College. In so doing, I found myself resisting giving an announced mission for the Center more specific than “to facilitate broad conversations ... essential to continuing explorations of ... the natural world and humanity’s place in it”, despite expressions of concern that such a mission was too diffuse to be either understood or meaningful. Its clear in hindsight that the Center paid a price for my stubbornness but also evolved successfully in ways that it might not otherwise have done. And that my stubbornness in turn related to an emerging

recognition on my part that what I was interested in was a victory neither for disciplinary nor interdisciplinarity but rather a way to productively associate the two.

The notion of “story”, and its extension to the “fuscia dot” and the value of “story sharing” and “conversations” proved to be a key to doing so. What is in academia less understood than it perhaps ought to be is that in the last analysis all disciplines are components of a common process of inquiry into the nature of humanity and its place in the universe, and all share what are, at the deepest level, common practices of observing, story telling, and story revising. Viewed in this light, it would seem obvious that interdisciplinary work can and should be valued in the academy. That it is less so than it might be relates, I have come to understand, to what differentiates the disciplines: the particular material on which they make observations, and associated norms and standards of what constitutes acceptable observations and stories. A scientist, for example, may doubt the value of observations on literary works as well as the values of stories that arise from them. Similarly, a literary scholar may question the usefulness of observations on molecular structures and the significance of stories that arise from those.

There are a variety of reasons for such doubt, some more obvious and some less so. A more obvious one is that within particular institutional structures there is a competition for resources, and one way to be more successful in such a competition is to denigrate the value of the work of competitors. A perhaps related and slightly less obvious reason for mutual suspicion among disciplines is their need to acculturate practitioners in the community standards of the discipline and their tendency to do so in a way that conveys, explicitly or implicitly, that those standards provide a unique and privileged access to understanding and truth, ie that the stories of the particular discipline are superior to those of any other. Perhaps still less obvious but following from this is a tendency to believe that one’s own ways of understanding are rooted in clear observations and appropriate interpretations of those observations, while those of other disciplines are “just stories” and so can be ignored.

Institutional structures can change and are changing in a way that is more encouraging and supportive of interdisciplinary conversation; the existence and ongoing development of the Center for Science in Society is one line of evidence for that. And, as this happens, individuals are discovering that interdisciplinary exchange can indeed enhance rather than threaten disciplinary perspectives (this collection and emergence collection); particular disciplinary perspectives are valuable but prove in fact to be complementary rather than antagonistic in relation both to disciplinary inquiries and to broader ones. Associated with this is an increasing awareness that stories are not in fact “just stories”; they are as integral to the process of inquiry as observations, critique, and the other apparatus of academic activity.

The value of stories seems to me a point of great significance, not only intellectually but also politically. My argument in the previous section was that because of the way the brain is organized, all understandings are stories (see also Grobstein, 2008) in two important senses. First, they represent an effort to make sense of observations without being precisely sure of exactly what the observations actually were and to what extent

they were influenced by the observer/story teller. Secondly, they are inevitably only one of multiple possible ways of making sense of observations and serve primarily to motivate new questions and new observations, not so much to understand what is as to conceive what might be. Hence, they have value somewhat independently of the observations that give rise to them. New stories, and therefore new possibilities for further exploration can arise as readily from comparing stories against one another as by comparing stories with new observations. The justification for interdisciplinary exchange, and the distinctive role of the “fuscia dot” relates to the new things that may arise not only from combing distinct sets of observations but equally from sharing and contrasting stories.

A similar argument hold in the arena of the political structures of academia. The disciplines have indeed special expertise in their own areas of inquiry (much as the delegates to a constitutional convention have in relation to the localities they represent). At the same time, there is a need for collective stories of the institution and intellectual enterprise as a whole. This can and should be provided by people whose business it is to listen to and contrast the separate activities of the disciplines and create from that new and broader stories that in turn can be tried out in more specific contexts. This, rather than being a hierarchical leader, is the role of the interdisciplinarian. Both intellectually and politically, a multi-level distributed interactive architecture like that seen in the human brain can provide advantages in academic contexts missing in either hierarchical or anarchistic structures. What is needed are people who have a willingness and inclination to acknowledge, rather than to challenge, the distinctive roles that different elements, disciplinary and interdisciplinary, play in effective interactive systems, and the value of the different stories they tell.

From the brain to social organization: Beyond the academic

Academic activities and structures may seem like a specialized arena of activity remote from day to day life and its challenges and problems, but a persistent conflict between hierarchical and decentralized approaches is not, and so the multilevel distributed interactive architecture outlined above may be of wider significance. In the following I draw on my experiences as an educator, parent, and citizen, as well as co-founder of the Serendip website, “an expanding forum ... to support intellectual and social change”.

Classrooms and families provide familiar examples of tensions between hierarchical and anarchistic approaches. From a traditional perspective, the teacher and parents are in positions of authority, the leaders, and students and children are and should be organized by them. As any teacher or parent knows, however, the hierarchical structure is to one degree or another always under challenge, and experienced teachers and parents eventually come to recognize not only that fully hierarchical organization may be impossible to sustain but that trying to do so may in fact impede students and children in terms of their individual development as responsible and creative entities in their own right.

Thinking in terms of a bilevel interactive and distributed architecture and story sharing offers a new perspective for thinking about classroom organization (Dalke and Grobstein, Dalke et al). It repositions students as also teachers, relieving some of the resistances inherent in hierarchical structures and giving students more meaningful incentive to participate not only in their own education but that of others as well. It also repositions the teacher as not an authority but a resource to support individual explorations ... and as the “interdisciplinary” story teller who feeds back activities and creations of students as more comprehensive stories that in turn serve as the grist for continuing development of individual stories. Taking on the role of the fuschia dot opens the teacher to greater engagement with students and to greater creativity on his or her own part. One can make similar arguments replacing teacher with parent and student with child. In both situations, there are gains to be made by choosing bilevel interactive and distributed architectures over either hierarchical or anarchistic structures, particularly if the teacher/parent sees their task as giving students/children the wherewithal to continue creating and revising their own stories in to deal with a continually and somewhat unpredictably changing environment.

This last point deserves emphasis: a bilevel interactive and distributed architecture is preferable **if** one anticipates a “continually and somewhat unpredictably changing environment”. Under such circumstances “the universe has lost its center overnight, and woken up to find it has countless centers. So that each one can now be seen as the centre, or none at all” (Brecht, 1966; see also Grobstein, 2004). Biological evolution occurring over millions of years has discovered a form of organization appropriate for ongoing change, one in which individuals are capable of both recognizing that there is no center and that they can each be a center. Human cultural evolution has been working for tens of thousands of years at the most, and has perhaps yet to recognize that stasis and stability is ephemeral, and that humans have the wherewithal to move beyond it. Perhaps it is time, not only in education and child-rearing, to bring culture more into line with our biological potentials?

The Serendip website is an exploration of the possibility of bringing out such cultural change, on a national and world wide scale. “A gathering site for people who suspect that life’s instructions are always ambiguous and incomplete” (Serendip n.d.), materials on Serendip are explicitly “non-authoritative”, providing not “answers” but opportunities for people to make use of other peoples’ stories to further develop their own, and to leave their own stories for other people to make use of in their own development. It is a place for engaged conversation, for story sharing, on the presumption that it is the business of every individual not to get it right but rather to engage in an ongoing individual and collective process of “getting it less wrong” (Grobstein, 2006), of “finding ways to tell our collective human story from which no one feels estranged” (Grobstein, 2001).

Prospectus

The tension between individualism and collectivism will not go away, but it can be recognized for what it is: a continual and valuable mechanism for assuring the generation of new and productive stories. The key to doing so is to replace the concept of a

hierarchy directed by a leader not with anarchy or “abject relativism” but rather with that of a multi-level interactive distributed system, one in which more local stories continually and reciprocally interact with more global ones with no a priori assumption that either has over-riding precedence. And to recognize that all individuals have valuable roles to play in such a system, as much because of their differences as because of their similarities (Grobstein, 1989).

Could we actually rebuild cultures in such a direction (Grobstein, 2003)? What would it take?

1. A willingness and ability of individuals to lead lives that are continually in process, lives that they shape themselves in terms of values that are also subject to continual ongoing interaction with those around them. Indeed an enthusiasm for being individually distinctive, not only for one’s own enjoyment but for the benefits it provides others. “The more I learn, the more I realize more and more that how I think and feel is different” (Grandin, 2005)
2. A willingness and ability of individuals to tell their own stories as they exist at any given time, indeed an enthusiasm for doing so as a contribution to the stories of others and the collective human story.
3. A willingness and ability of individuals to hear the stories of others, not as alternatives or competitors to one’s own but rather as the essential grist for one’s own story revisions and the further evolution of collective stories.
4. A willingness and commitment to a permanent process of “getting it less wrong”, to the evaluation of stories based on their usefulness in the present and their potential for generating new stories in the future.
5. A socio-political-economic system that discourages hierarchical power relationships as well as reactive anarchy and encourages instead continual bi-directional interaction among all humans.
6. Confidence in the evolution from such interactions of new and productive stories that provide new solutions to existing problems. A serious commitment not to trying to shape the present to fit lessons learned in the past but to using the past and present to create new futures.

That may seem, on the face of it, a daunting prescription, one that flies in the face of existing social-political-economic norms, and perhaps even in the face of “human nature” itself. On the other hand, socio-political-economic norms are themselves collective stories, and subject to change due to new stories and actions of individuals. My own experiences indicate that it is indeed possible to create environments at local levels that instantiate multi-level interactive distributed architectures, and that many individuals find, often to their surprise, that they feel more comfortable and productive in them. The challenge then is to find ways to scale that up to larger human groups. It is a challenge that may necessarily be met only with time, as people gain experience in more local settings and so begin expecting similar organization at larger scales.

As for “human nature”, a principle theme of this essay is that there isn’t one. “I am, and I can think, therefore I can change who I am” (Grobstein, 2004), and things around me as

well. Yes, we all start with certain understandings, preferences, biases, and the like, including perhaps a wish for something stable and certain on which we can build our lives. But we are also story tellers (see Rorty, 1999), and that gives us the capacity to conceive what has not yet been and, potentially, to bring it into existence. If nothing else, I hope this essay serves to remind all readers that that capacity is built into their brains, and can be used, by everyone, to create “less wrong” cultures and worlds. If I have encouraged some to think it is possible that cultural organizations, both small and large, might usefully be reconfigured around those capabilities, so much the better.

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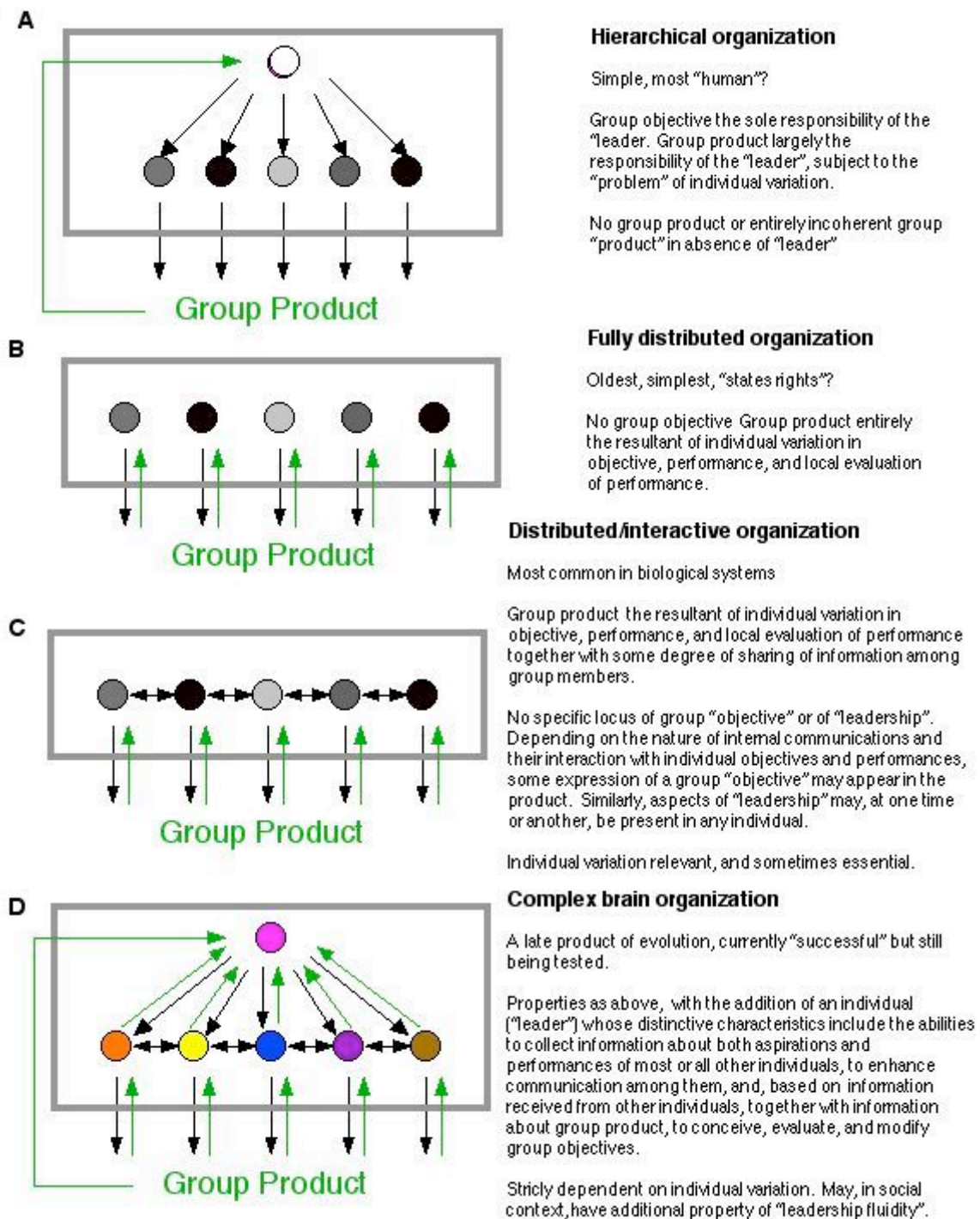


Figure 1. From <http://serendip.brynmawr.edu/local/scisoc/leadership04/leadership.html>

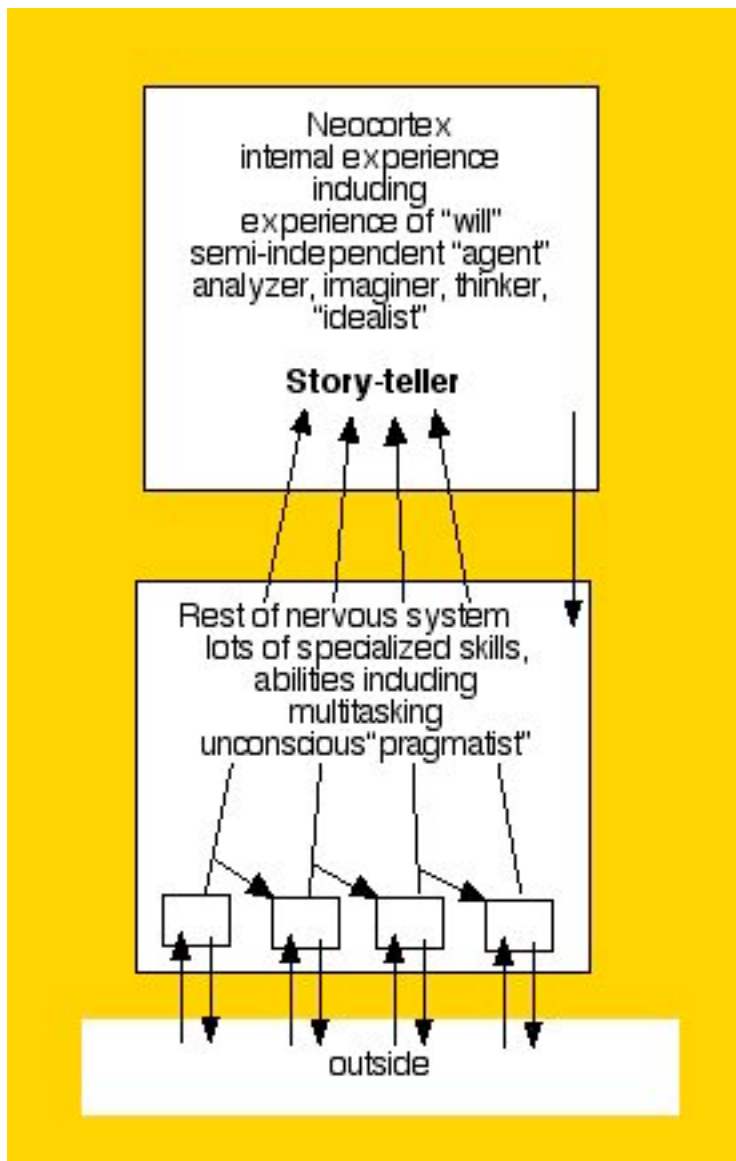


Figure 2. From <http://serendip.brynmawr.edu/bb/bipartitebrain/>