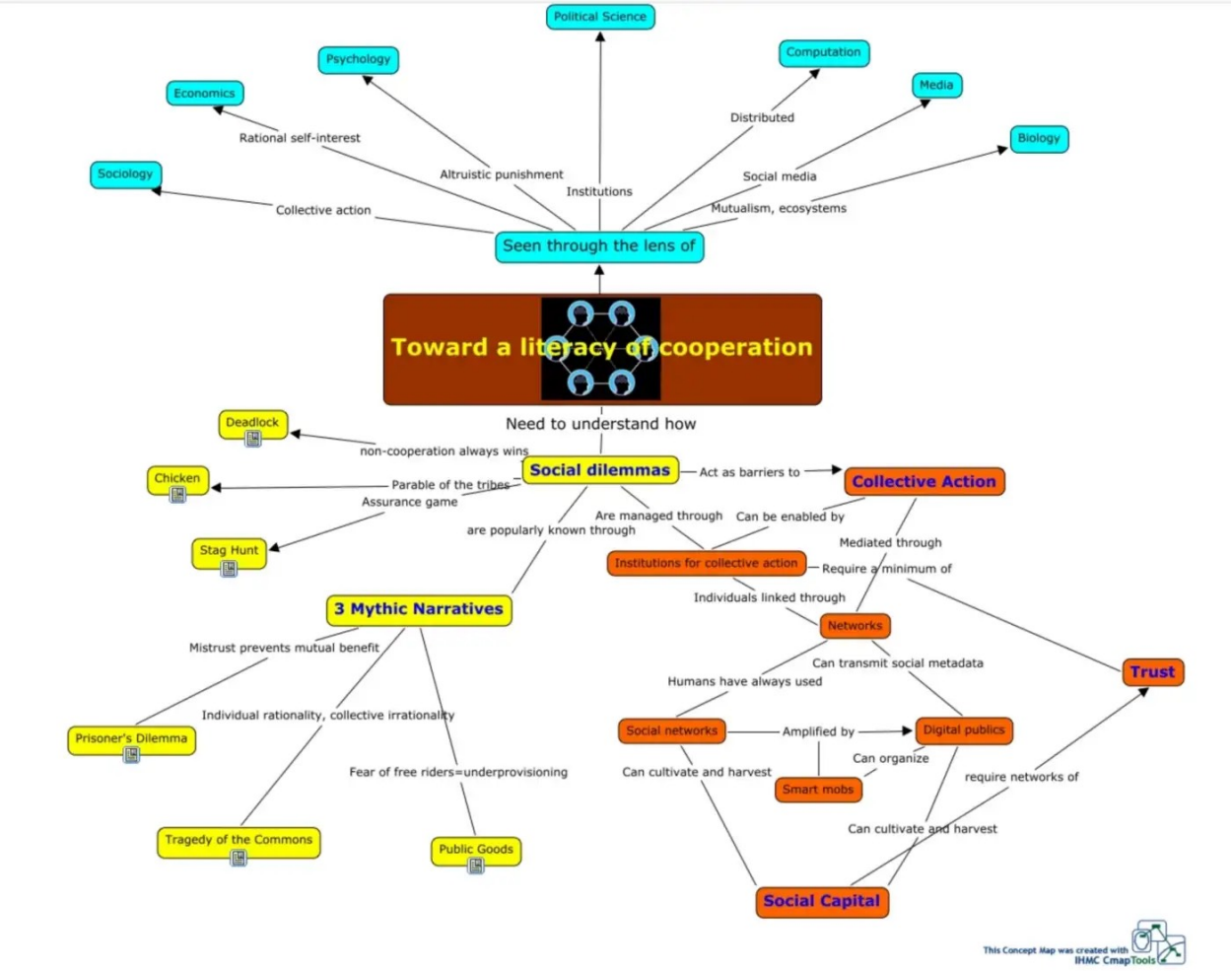
Intro to Cooperation Studies

I originally started publishing this on my Patreon site, but would like to introduce it to broader circulation. Feel free to support me on Patreon for access to exclusive content (curated links like these, art-making, creative process) and other rewards.

Climate change, proliferation of weapons of mass destruction, environmental protection and remediation, preservation of human rights… the biggest problems of our time are problems of cooperation, the lack of it, obstacles to it, and ways to work around those obstacles. This syllabus introduces the fundamental work in several disciplines that underpin what science now understands about cooperation.



(**Clickable concept map**)

I started to research the book that became Smart Mobs in 1999–2000, when I noticed people on the streets of Tokyo and Helsinki (but not, in those pre-iphone days, on the streets of USA) walking along while looking at their telephones. While the technology I focused on was the merger of the personal computer, the mobile telephone, and the Internet — which came to be known as the smart phone — it was clear from the start that the upheaval to come would be social. Smart phones lowered the barriers to collective action. When I started to educate myself about the study of collective action, it became clear to me at the time — and still seems clear — that understanding the nature, driving forces, and obstacles to human cooperation is one of the most important learning enterprises humans ought to embark upon. I talked about the importance of an interdisciplinary study of cooperation and collective action in my 2005 TED talk, which is closing in on one million views.

I was naive about the prospects for sparking a truly comprehensive interdisciplinary study. The knowledge-producing institutions of our time — universities, government agencies, commercial laboratories — measure the success of practitioners by their progress in increasingly atomized subdisciplines. This is itself an example of a social dilemma — what is good for the individual (success as a commercial or academic producer of knowledge in their microfield) is not always good for the entire population (most wicked problems require the lenses and frameworks of multiple disciplines). With my colleague from Institute for the Future, Andrea Saveri, we presented a series of lectures and discussions at Stanford University, featuring speakers such as Jimmy Wales (who stayed in the loft in my office before we drove to Palo Alto — I dropped him off at Google after his lecture). But I simply didn't know how to create an institutional home — and fund it — at Stanford.

Institute for the Future was the one organization that embraced my idea of a high-altitude, cross-disciplinary look at cooperation studies. I worked with Saveri and Kathi Vian, initially sponsored by Herman Miller company, with whom we constructed a handbook for open design. Together with IFTF creative lead Jean Hagen, they took the spaghetti-code chaos of the interconnections I was attempting to map and made it into real maps.

For a time, I tried to get institutions from the Carnegie Corporation to the Omidyar Network to fund a "cooperation academy." My reason was that people who work in cooperation-related fields, from economic development to ecological remediation to arms control, would be able to think about their specific problems more effectively if they understood what is known about the underpinnings of cooperation. I'm not so good at talking institutions into funding my ideas, especially since I'm not a Ph.D. So I started teaching online courses on cooperation. Although I charged tuition for a five week experience in which we engaged each other around the texts via forums, blogs, mindmaps, and webinars, the syllabus is freely available to anyone who wants to dig into the extensive collection of texts.

The following material scaffolds the texts, introducing the fundamental concepts around the biological and cultural evolution of cooperation, the characteristics of social dilemmas, the institutions for collective action that people have created to work around these social dilemmas, and the technologies of cooperation, from the alphabet to the smartphone, that have amplified capabilities for collective action. Individual autodidacts or peer learning groups can use the

syllabus for reading and use the following material, including videos of lectures from the online course, to scaffold the readings.

Starting in 2011, I started teaching an online course, Toward a Literacy of Cooperation, which I repeated eight times. The course syllabus includes an extensive list of texts, some of which were required for the course, many more of which were recommended. I prepared five lectures, starting with cooperative arrangements in biology, continuing with biological and cultural evolution of cooperation, social dilemmas, institutions for collective action, and technologies of cooperation. The lectures used slides, audio, video, and chat. My co-learners were active participants, text-chatting in parallel, asking questions and offering their own points, searching and contextualizing relevant links, identifying and defining words for a shared lexicon, creating a wiki page with the links and chat transcript.

These interactive lectures were recorded and can be replayed:

Introduction to the course and cooperative arrangements in biology

Biological and cultural evolution of cooperation

Social dilemmas

Institutions for collective action

Technologies of Cooperation

Each interactive lecture was followed by a week of conversations and learning activities, using a forum, blogs, a wiki, mindmapping, and social bookmarking.

I made a concept map to show some of the relationships between these different disciplinary approaches.

Introduction to the course and cooperative arrangements in biology

The online course on cooperation studies that I taught 8 times started with cooperative arrangements in biology, then moved on, respectively, to the biological and cultural evolution of cooperation, social dilemmas, institutions for collective action, and technologies of cooperation. You can access the recording of the first live audio-video collaborative session if you want to see my slide show (and my framing of co-learning via social media) One of my co-learners, Roland LeGrand, a Belgian journalist, made excellent notes of my first live session.

Although there are many more texts in the syllabus about this aspect of cooperation, the most fundamental are about symbiosis, biological synergies, and cooperative arrangements in evolution.

Lynn Margulis and endosymbiosis:

Lynn Margulis was a young biologist when she presented evidence that eukaryotic cells — cells with nuclei — must have started out as symbiotes. In other words, very early in evolution, a single-celled organism without a nucleus merged with another organism to create a cooperative ("symbiotic") relationship that continues to this day. The mitochondria, the organelles that provide the energy for animal cells the way chloroplasts provide energy for plant cells, are passed along only through the maternal line. Because evolutionary dogma was fixated on competition, the notion that a cooperative arrangement was important at the very beginning of life on Earth, challenged the established paradigm. Her first paper was rejected by a couple dozen scientific journals before it was published. It turns out that cooperative arrangements, from mutually beneficial symbiosis to parasitism that benefits only one partner and sometimes kills the host, is important up and down the evolutionary ladder.

A quick summary of Margulis on endosymbiosis

As above, so below: the worldview of Lynn Margulis

Darwin was not blind to the complementary relationship of cooperation and competition, but Darwin's defenders in the 19th century became fixated on competition, "survival of the fittest," and "nature, red in tooth and claw." Frank Ryan's "Darwin's Blind Spot: Evolution Beyond Natural Selection" sets the stage for he biological and cultural evolution of cooperation.

Biological and cultural evolution of cooperation

I started the syllabus with symbiogenesis, synergies, and other complex biological interdependencies to establish how life itself is grounded in cooperative arrangements as well as competition. The second module is about the ways culture (everything we learn from each other) and biology (everything we are born with) have interacted and shaped the evolution of human cooperation.

Here is a recording of the live session in which I lectured and interacted with co-learners about the biological and cultural evolution of cooperation.

Key to the transition from biological to cultural evolution is the notion of exaptation — the development of a capability not by direct Darwinian adaptation (mutations that confer favorable survival circumstances spread through species over long periods of time) but by application of previously evolved adaptations to further environmental advantage. For example, feathers may have originally been an adaptation that conferred heat insulation advantages in cold

environments, but may have been exapted to enable flight. In humans, our species evolved biological characteristics as adaptations to the environment that were later used culturally — for example, humans are the only primates where the whites of our eyes are visible at a distance, which means that human babies can learn by paying attention to where their mothers and others are looking. We may have evolved the brain capacity for keeping paying attention to faces and behaviors of others of our species in order to participate in increasingly complex cooperative behaviors in groups (the social brain hypothesis). Together with our separate capacity to observe each other's focus of attention, our social wiring contributes to our capacity for social learning. Social learning is where culture kicks in. Once a human has figured out how to use our biologically evolved capabilities in a new and useful way, that exaptation can be spread through contemporaries (instead of just future generations) immediately (instead of taking place over millions of years). Exaptation and social learning kicked the biological evolution into a higher gear for our species.

Fundamental Texts:

In regard to the biological evolution of cooperation, this transcript of a talk by Martin Nowak gives succinct and clear descriptions of not just the key theories of group selection and kin selection, but a good overview of how Darwinian evolution — and an overview of the game theory that Robert Axelrod introduced into this discourse. As Nowak points out, the transition from the all-species evolution of cooperative mechanisms through Darwinian processes to the human-only evolution of cultural mechanisms of cooperation was, and continues to be, radical — expanding both the scope and pace of change.

Do primates share an evolved sense of fairness? Start with this: This video, a bit over 2 minutes long, is not only "the funniest moments" from de Waal's TED presentation, but gets the point across within the first minute.

In the 1980s, Robert Axelrod performed some psychology experiments based on game theory in order to probe possible solutions to one of humankind's most acute cooperation problems — nuclear-armed nation states that don't trust each other. Some of my students objected to reducing human cooperation to game theory — which was originally developed at RAND corporation to make sense of nuclear war strategy — to which I respond by framing game theory as one lens for observing the dynamics of cooperation. Axelrod's "Evolution of Cooperation" is a foundational document that gives us a kind of microscope or telescope for viewing cooperation systematically. Margulis and symbiosis furnishes another lens. Peter Kollock's work on social dilemmas offers a different view. Ostrom's research on institutions for collective action furnishes another way to look at this necessarily interdisciplinary, multifaceted phenomenon. Margulis, Kollock, Axelrod, Ostrom and Henrich offer five different but related essential means of viewing human cooperation.

Axelrod's work is fundamental. Thinking about cooperation, evolution, game theory, and computer simulation led him to use what has since become the e. coli of cooperation studies, the computer-simulated iterated prisoner's dilemma game, a strategy game that probes the ways human react when given the choice between assured self interest and potential but not guaranteed benefits of cooperation. Axelrod's "Three Conditions" brings the gist of his research to a practical level that can then be used as a lens for looking at collective action online: what are the

most important conditions for ensuring cooperation among strangers in a competitive environment.

I had introduced the role of symbiosis and other cooperative arrangements in the living world, theories about how competitive Darwinian evolution could have led to this pervasive cooperation, and talked about the notion that our species exapted our biologically evolved capabilities to create language, then to use language to create culture. A number of evolutionary biologists, anthropologists, and economists have looked at cultural evolution as a kind of Darwinian process in which problem-solving, innovation, and communication rather than mutation lead to a progression of changes that undergo a selection process in response to the characteristics of the environment.

For example, our communication media are channels for passing along to other humans discoveries about means of enhancing survival and ways of life. We don't know a lot about the evolution of speech, but the origins of writing, the printing press, the Internet, and their effects on human life are known — all consciously created cultural equivalents of mutated genes that enhanced and expanded every human's capability of knowing and teaching. Cultural evolution theorists (Boyd, Henrich, Richerson, Gintis, Bowles to name a few) have elaborated on how this might have happened — and will continue to happen. Those who are really serious about educating themselves about these ideas could start by reading the works listed on these scientists' websites (linked above).

A few key concepts:

- Culture — what we learn from each other, is an exaptation of our species' social and cognitive capabilities.
- The evolved capacity for social learning was particularly adaptive for homo Sapiens during times of radical environmental change.
- Learning capacities created processes that changed the selection environment in which genes develop: cooking meat, for example (a cultural invention) selects for those with carnivorously efficient digestive chemistry.
- Culture evolves via selection, but change grows more from design than mutation.
- Channeling of tribal instincts via symbol systems involves cultural transmission & selection that continues evolution of cooperative human capacities at a cultural ratyher than genetic level — and pace.
- "Surely, without punishment, language, technology, individual intelligence and inventiveness, ready establishment of reciprocal arrangements, prestige systems and solutions to games of coordination, our societies would take on a distinctly different cast. Thus, a major constraint on explanations of human sociality is its systemic structure." Boyd, Henrich, Richerson

Biological vs Cultural Evolution

Biological Evolution	Cultural Evolution
Traits can be transmitted to a person only from parents	Cultural traits can be transmitted to a person by many unrelated people
Transmission can only occur from one generation to the next	Transmission can be within or between generations and can be widely separated in time and space
Occurs at a slow pace, with many generations needed to spread a trait widely through a population	Occurs at a fast pace, may involve immediate learning and does not require inheritance
Traits acquired in a lifetime cannot be transmitted via genetic inheritance	Cultural traits can be transmitted within a lifetime via teaching or imitation
People cannot choose which genetic traits they will inherit	People can choose to accept or reject some cultural traits
Data transmitted is encoded by genetic material (DNA)	Data transmitted can assume the form of written or spoken language

slideplayer.com/slide/9834148/

Here are a few key texts to get started on the cultural evolution of cooperation, and here is the recording of the online interactive lecture I gave on the topic.

Robert Boyd, Joseph Henrich, and Peter Richerson, Cultural Evolution of Human Cooperation: Summaries and Findings (summary)

Joseph Henrich, "How Culture Drove Human Evolution" (39 minute video — or read the transcript that accompanies it).

Peter Richerson, Robert Boyd, and Joseph Henrich, **Rapid cultural adaptation can facilitate the evolution of large-scale cooperation,** (PDF)

Samuel Bowles and Herbert Gintis, A Cooperative Species: Human Reciprocity and Its Evolution Introduction and Conclusion (PDF)

Mark Pagel, Wired for Culture: The natural history of human cooperation (16 minute video)

Social dilemmas

It's more convenient for you to hop in your car to drive somewhere, rather than waiting for public transportation, walking, or riding a bike. When hundreds of millions of people hop in their cars every day in a rush hour that rolls around the time zones, tons of pollutants and increasing traffic jams inconvenience everybody. This is a social dilemma known popularly as "the tragedy of the commons."

You have something valuable to sell and someone you don't know in another state wants to buy it. But you aren't going to ship the valuable until you get the money, and the buyer isn't going to send the money until you ship the valuable. This social dilemma is known as "the prisoner's dilemma."

Peter Kollock defined a social dilemma as a situation where individual rationality adds up to collective irrationality. You and the hundreds of millions of other automobile drivers are caught in an irrational situation of your own creation, as are you and the potential buyer of your valuable. These conflicts, which occur throughout the biological world and reach new levels of complexity when the conflicts involve large numbers of human beings, stem from the fundamental decision every organism has to make when it weighs self-interest against the potential gains or losses of collective action.

In the fourth post in this series, I introduced fundamental texts about the game-theoretic lens on cooperation. Looking through one side of that lens, social dilemmas are seen as cold, calculating, selfish, rational processes — a characterization of human behavior that many question. Turn the lens around and the possibility of working around these dilemmas — by creating institutions for collective action (which I will treat in the next installment) — comes into view. Neither the biological, evolutionary, cultural, game-theoretic, economic, technological, lens alone is adequate for perceiving the multidimensional nature of human cooperation. Taken together, however, and a bigger picture starts to come into focus.

In addition to the following texts, the interactive lecture from the eighth installment of my online course on Intro to Cooperation Studies, and the complete list of recommended texts are available for those who want to dig deeper

Peter Kollock Social Dilemmas (video)

Kollock, who died in a traffic accident in 2009, addressed the Stanford seminar on "A new literacy of cooperation," led by Andrea Saveri and Howard Rheingold, in 2005.

Peter Kollock: Social Dilemmas (PDF)

After you watch Kollock's screencast and want to read a superbly written literature review of interdisciplinary research and theory regarding social dilemmas, this paper (PDF download) is essential.

Steven Pinker: The Elephant, the Emperor, and the Matzo Ball (Video)

Steven Pinker's lecture reveals the relationships between social knowledge and cooperation

Introduction to Social Dilemmas

A good summary and overview

Leon Felkin, The Social Dilemmas (an overview)

This is a succinct overview of social dilemmas, game theory, proposed solutions.

Institutions for collective action

Co-learners in my online course join it because they want to DO something about cooperation. The course takes its time getting there in order to lay an interdisciplinary foundation in the biology of complex interdependencies, the biological and cultural evolution of cooperation, the cultural exaptations that make increasingly elaborate and powerful forms of cooperative behavior possible, the social dilemmas that arise from the tension between self-interest and collective action. With Institutions for Collective Action, we arrive at the beginnings of practical knowledge. Because of the dependence of these social dilemma workarounds on "local conditions," which can be environmental, cultural, or both, there isn't an algorithm for guaranteeing cooperation. But we are beginning to see the outlines of design principles for the kind of arrangements that enable cooperation.

Garrett Hardin, (1968) "The Tragedy of the Commons," *Science*, 162 (1968): 1243–48

This is the foundational paper for the modern study of the commons (and modern students of the commons would say that Hardin is not referring to a commons, which is managed in some way by a community, but to an open access common pool resource). Looking ahead to the 21st century from the late 1900s, Hardin foresaw disaster in the way the human population was doubling, and more, with each succeeding generation. He referred to the way common grazing grounds have been overgrazed when individual farmers, unrestrained by regulation or property rights, added more and more animals to their flocks until the common meadows became overgrazed and unusable. Isn't global climate change a commons problem? Ostrom and other modern theorists react to Hardin. This short paper should be read by anyone who wants to understand issues of human collective action — but no reader should stop with Hardin, whose gloomy assumptions have been shown by others to be something other than inevitable

Elinor Ostrom, Governing the Commons: Evolution of Institutions for Collective Action (summary) and one minute video

Ostrom asked of Garrett Hardin's gloomy prophecies regarding the "tragedy of the commons" the question any scientist should ask: is it really true that humans will inevitably despoil any common resource? Looking and thousands of records, ancient and modern, of human use of shared watersheds, fishing and hunting grounds, forests and grazing lands, Ostrom found that a significant portion of communities found ways to override basic social dilemmas, by constructing systems of norms and self-policing social contracts. Ostrom is getting at something deep — can humans learn to be more cooperative through our culturally constructed institutions than our biological heritage as competitive creatures naturally affords? Ostrom's scope is wide. She wants to know how groups of people overcome barriers to collective action and why they fail to overcome them.

Silke Helfrich via David Bollier, Eight Points of Reference for Commoning

Ostrom is essential. Her writing can also be very technical. Here is a remix of her design principles for institutions of collective action in the language of the commons.

Ostrom's Nobel Prize Speech (one hour video) (Text is available as a PDF)

Cat Johnson, Dog Parks, Humans and the Commons

Dog parks, dog owners, and dog poop are the main ingredients in commons-management experiments that take place in communities all over the globe. This report describes empirical research that tests Ostrom's design principles in a real-life situation.

Jennifer Jacquet, Christoph Hauert, Arne Traulsen, Manfred Milinski, "Shame and Honor Drive Cooperation.

Institutions for collective action are held together more often by norms that are enforced by a population through informal sanctioning than they are by laws enforced by official enforcement institutions. Shame and honor are means by which this informal enforcement is distributed through a population.

Institutions for collective action enable new forms of economic production when linked to digital media and networks, sometimes called "social production" (as in the Web, Wikipedia, open source software). The following are a few references to that aspect

"The Penguin and the Leviathan: The Triumph of Cooperation Over Self-Interest," long blog summary of Yochai Benkler's book

"Distributed Innovation and Creativity, Peer Production, and Commons in Networked Economy," 2013 short chapter by Benkler

"A different way of doing things," Economist article about co-ops — another economic institution for collective action.

"Emergent Properties of Balinese Water Temple Networks: Coadaptation on a Rugged Fitness Landscape," a summary of the work Stephen Lansing reported in his book, *Perfect Order*. The ways Balinese farmers evolved their water temple system is a breathtaking symphony

of institutions for collective action, religion, agronomy, and ecology. Lansing summarizes in this 15 minute video.

Technologies of Cooperation

Humans are the dominant species on this planet because we learned to use verbal communication to organize and coordinate collective action: Collective defense by diminutive primates who lacked muscles, speed, claws, fangs and collective food-gathering. Speech, writing, print, Internet, mobile media each multiplied the ability of humans to do things in groups — beneficial things and destructive things. I started to explore this idea when I first noticed, in 1999–2000, that people in Helsinki and Tokyo (but not yet New York or Los Angeles) were walking around staring at their phone screens. When I realized that the mobile telephone, the Internet, and the personal computer were merging into a new and rapidly growing medium now known as the smartphone, I started looking for signals of social impacts. When the "People Power II" movement in the Philippines, led by the young SMS enthusiasts who called themselves "Generation TXT" organized demonstrations that deposed the Philippine President, Joseph Estrada — the first demonstrations coalescing spontaneously in a matter of hours — I saw a signal. The "Battle of Seattle," when protestors used mobile phones and Internet to organize demonstrations against the World Trade Organization, was another signal. In the political realm, the new hybrid medium had dramatically lowered barriers to self-organized political collective action.

But it wasn't just the political realm. The World Wide Web itself, Wikipedia, eBay, Open Source, emergent collective response to disaster relief, crowdfunding, collective computation, citizen journalism were all examples of technology-enabled collective action. I wrote a book — Smart Mobs — that was published in 2002 (nine years before the "Arab Spring" brought smartmob-enabled revolutions to the world's attention). After I wrote the book, I gave a TED talk that called for an interdisciplinary study of collective action, then worked with Institute for the Future on creating a foundation of interdisciplinary research.

Although I am certain that other categories of technologies of cooperation exist, these are the main areas:

Technologies of Cooperation

amplified collective action

social production

collective computation

augmented collective intelligence

stigmergic collaboration

The sites linked from the category names above and the following references can get you started on understanding the scope of this techno-social shift that continues to transform politics, knowledge gathering, business, collaborative work, journalism.

Technologies of Cooperation Report (PDF)

This report was prepared by Institute for the Future by Kathi Vian, Andrea Saveri, and Howard Rheingold

Technologies of Cooperation map 2005 (PDF)

This chart was created by the Institute for the Future in collaboration with Howard Rheingold, attempting to systematize the relations between the technological affordances and social practices of online collaboration.

Peter Kollock, The Economics of Online Cooperation: Gifts and Public Goods in Cyberspace 1999

Mark Elliott, Stigmergic Collaboration: The Evolution of Group Work 2006

Michel Bauwens and Alekos Pantazis, Ecosystem of Commons-Based Peer Production and its Transformative Dynamics 2018

Howard Rheingold, Smart Mobs 2002

Thomas W. Malone, Superminds: The Surprising Power of People and Computers Thinking Together 2018

Howard Rheingold (curated links) Augmented Collective Intelligence

David Bollier, Applying Ostrom's Guidelines to the Design of Software Platforms

Mark Elliott, Stigmergic Collaboration: The Evolution of Group Work

Unsigned Economist Article, The New Politics of the Internet