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Howard Rheingold

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15. Smart mobs

the power of the mobile many

Howard Rheingold

Smart mobs consist of people who are able to act in concert even if they don't know each other. The people who make up smart mobs cooperate in ways never before possible because they carry devices that possess both communication and computing capabilities.

An unanticipated convergence of technologies is suggesting new responses to civilisation's founding question, How can competing individuals learn to work cooperatively? Location-sensing wireless organisers, wireless networks and community supercomputing collectives all have one thing in common: *they enable people to act together in new ways and in situations where collective action was not possible before.*

The 'killer apps' of tomorrow's mobile infocom industry won't be hardware devices or software programmes but social practices. The most far-reaching changes will come, as they often do, from the kinds of relationships, enterprises, communities and markets that the infrastructure makes possible.

Netwar – Dark and Light

On 20 January 2001, President Joseph Estrada of the Philippines became the first head of state in history to lose power to a smart mob. Following the abrupt ending of his impeachment trial by sympathetic senators, Manila residents began to assemble in their thousands on Epifanio de los Santas Avenue (known as 'Edsa'), the site of the 1986

'People Power' peaceful demonstrations that had toppled the Marcos regime. Within 75 minutes, 20,000 people had converged on Edsa, mobilised and coordinated by waves of text messages initiated by opposition leaders: 'Go 2EDSA, Wear blck'. Over four days, more than a million people showed up, mostly dressed in black. The military withdrew support from the regime; the Estrada government fell, as the Marcos regime had fallen a decade previously, largely as a result of massive non-violent demonstrations. The rapid assembly of the anti-Estrada crowd was a hallmark of early smart mob technology, and the millions of text messages exchanged by the demonstrators in 2001 were, by all accounts, a key to the crowd's esprit de corps. The legend of 'Generation Txt' was born.

Bringing down a government without firing a shot was a momentous early eruption of smart mob behaviour. It wasn't, however, the only one.

- On 30 November 1999, autonomous but internet-worked squads of demonstrators protesting at the meeting of the World Trade Organisation (WTO) used 'swarming' tactics, mobile phones, websites, laptops and PDAs to win 'The Battle of Seattle'.
- In September 2000, thousands of citizens in Britain, outraged by a sudden rise in gasoline prices, used mobile phones, SMS, email from laptop PCs and CB radios in taxicabs to coordinate dispersed groups that blocked fuel delivery at selected service stations in a wildcat political protest.
- A violent political demonstration in Toronto in the spring of 2000 was chronicled by a group of roving journalist–researchers who webcast digital video of everything they saw.
- Since 1992, thousands of bicycle activists have assembled monthly for 'Critical Mass' moving demonstrations, weaving through San Francisco streets en masse. Critical Mass operates through loosely linked networks, alerted by

> mobile phone and email trees, and breaks up into smaller, tele-coordinated groups when appropriate.

The Battle of Seattle saw a more deliberate and tactically focused use of wireless communications and mobile social networks in urban political conflict, more than a year before texting mobs assembled in Manila. A broad coalition of demonstrators who represented different interests but were united in opposition to the views of the World Trade Organisation planned to disrupt the WTO's 1999 meeting in Seattle. The demonstrators included a wide range of different 'affinity groups' who loosely coordinated their actions around their shared objective. The Direct Action Network enabled autonomous groups to choose which levels of action to participate in, from non-violent support to civil disobedience to joining mass arrests – a kind of dynamic ad hoc alliance that wouldn't have been possible without a mobile, many-to-many, real-time communication network. According to a report dramatically titled 'Black flag over Seattle' by Paul de Armond:

> *The cohesion of the Direct Action Network was partly due to their improvised communications network assembled out of cell phones, radios, police scanners and portable computers. Protesters in the street with wireless Palm Pilots were able to link into continuously updated web pages giving reports from the streets. Police scanners monitored transmissions and provided some warning of changing police tactics. Cell phones were widely used.*[3]

From Seattle to Manila, the first 'netwars' have already broken out. The term 'netwar' was coined by John Arquilla and David Ronfeldt, two analysts for the RAND corporation, who noticed that the same combination of social networks, sophisticated communication technologies, and decentralised organisational structure was surfacing as an effective force in very different kinds of political conflict:

> *Netwar is an emerging mode of conflict in which the protagonists – ranging from terrorist and criminal organisations on the dark side, to militant social activists on the bright side – use network forms of organisation, doctrine, strategy, and technology attuned to the information age… These networks are proving very hard to deal with; some are winning. What all have in common is that they operate in small, dispersed units that can deploy nimbly – anywhere, anytime.*[4]

The 'swarming' strategies noted by Arquilla and Ronfeldt rely on many small units like the affinity groups in the Battle of Seattle. Individual members of each group remained dispersed until mobile communications drew them to converge on a specific location from all directions simultaneously, in coordination with other groups. Manila, Seattle, San Francisco, Senegal and Britain were sites of non-violent political swarming. Arquilla and Ronfeldt cited the non-governmental organisations associated with the Zapatistas movement in Mexico, which mobilised world opinion in support of Indian peasants, and the Nobel Prize-winning effort to enact an anti-landmine treaty as examples of non-violent netwar actions. Armed and violent swarms are another matter. The Chechen rebels in Russia, soccer hooligans in Britain and the FARC guerrillas in Colombia also have used netwar strategy and swarming tactics.[5] The US military is in the forefront of smart mob technology development.

Smart mobs engaging in either violent or non-violent netwar represent only a few of the many possible varieties of smart mob. Netwars do share a similar technical infrastructure with other smart mobs. More importantly, however, they are both animated by a new form of social organisation, the network. Networks include nodes and links, use many possible paths to distribute information from any link to any other, and are self-regulated through flat governance hierarchies and distributed power. Arquilla and Ronfeldt are among many who believe networks constitute the newest major social organisational form, after tribes, hierarchies and markets. Although

network-structured communications hold real potential for enabling democratic forms of decision-making and beneficial instances of collective action, that doesn't mean that the transition to networked forms of social organisation will be a pleasant one with uniformly benevolent outcomes. Arquilla and Ronfeldt note the potential for cooperation in examples like the non-governmental organisations that use netwar tactics for public benefit, but they also articulated a strong caution, worth keeping in mind when contemplating the future of smart mobs:

> *Most people might hope for the emergence of a new form of organisation to be led by 'good guys' who do 'the right thing' and grow stronger because of it. But history does not support this contention. The cutting edge in the early rise of a new form may be found equally among malcontents, ne'er-do-wells, and clever opportunists eager to take advantage of new ways to manoeuvre, exploit, and dominate.*[6]

Lovegety and peer-to-peer journalism

In light of the military and terrorist potential of netwar tactics it would be foolish to presume that only benign outcomes should be expected from smart mobs. But any observer who focuses exclusively on the potential for violence would miss evidence of perhaps even more profoundly disruptive potential – for beneficial as well as malign purposes – of smart mob technologies and techniques. Could cooperation epidemics break out if smart mob media spread beyond warriors – to citizens, journalists, scientists, people looking for fun, friends, mates, customers or trading partners?

Consider a few experiments on the fringes of mobile communications that might point towards a wide variety of non-violent smart-mobbing in the future:

- 'Interpersonal awareness devices' have been evolving for several years. Since 1998 hundreds of thousands Japanese have used Lovegety keychain devices that signal when

another Lovegety owner of the opposite sex and compatible profile is within 15 feet.
- ImaHima ('are you free now?') enables hundreds of thousands of Tokyo i-mode users to alert buddies who are in their vicinity at the moment.
- Upoc ('universal point of contact') in Manhattan sponsors mobile communities of interest: any member of 'Manhattan celebrity watch', 'nyc terrorism alert', 'prayer of the day' or 'The Resistance', for example, can broadcast text messages to and receive messages from all the other members.
- Phones that make it easy to send digital video directly to the web make it possible for 'peer-to-peer journalism' networks to emerge; Steve Mann's students in Toronto have chronicled newsworthy events by webcasting everything their wearable cameras and microphones capture.
- Researchers in Oregon have constructed 'social middleware' that enables wearable computer users to form ad hoc communities, using distributed reputation systems, privacy and knowledge-sharing agents, and wireless networks.

In 2000 WearComp researcher, innovator and evangelist Steve Mann launched 'ENGwear, an experiment in wearable news-gathering systems conducted by students and researchers at the Humanistic Intelligence Lab at the University of Toronto'.[7] In the spring of 2000 Mann and a group of his students, all wearing computers equipped with 'EyeTaps', which broadcast everything they saw and heard to the Web, showed up at a demonstration in Toronto called by the Ontario Coalition Against Poverty (OCAP). Violence broke out. Mann reported:

> *We, along with the journalists and various television crews, ran for cover. However, unlike the reporters, my students and I were*

still broadcasting, capturing almost by accident the entire event. Whatever we saw before us was captured and sent instantly in real time to the World Wide Web, without our conscious thought or effort.[8]

Swarm intelligence and the social mind

Massive outbreaks of cooperation precipitated the collapse of communism. In city after city, huge crowds assembled in non-violent street demonstrations, despite decades of well-founded fear of political assembly. Although common sense leads to the conclusion that unanimity of opinion among the demonstrators explained the change of opinion, Natalie Glance and Bernardo Huberman, Xerox PARC researchers who have studied the dynamics of social systems, noted that a diversity of cooperation thresholds among the individuals can tip a crowd into a sudden epidemic of cooperation. Glance and Huberman pointed out that a minority of extremists can choose to act first and, if the conditions are right, their actions can trigger actions by others who needed to see somebody making the first move before acting themselves – at which point the bandwagon-jumpers follow the early adopters who followed the first actors.[9]

Sudden epidemics of cooperation aren't necessarily pleasant experiences. Lynch mobs and entire nations cooperate to perpetrate atrocities. Decades before the fall of communism, sociologist Mark Granovetter examined radical collective behaviour of both positive and negative kinds and proposed a 'threshold model of collective behaviour'. I recognised Granovetter's model as a crucial conceptual bridge that connects intelligent (smart mob) cooperation with 'emergent' behaviours of unintelligent actors, such as hives, flocks and swarms.

Granovetter studied situations in which individuals were faced with either–or decisions regarding their relationship to a group – whether or not to join a riot or strike, adopt an innovation, spread a rumour, sell a stock, leave a social gathering, migrate to a different country. He identified *the pivotal statistic as the proportion of other people who would have to act before an individual decides to join them.*

One of Granovetter's statements yielded a clue to smart mob dynamics: 'By explaining paradoxical outcomes as the result of aggregation processes, threshold models take the "strangeness" often associated with collective behaviour out of the heads of actors and put it into the dynamics of situations.'[10]

Threshold models of collective action are about media for exchange of coordinating knowledge. Understanding this made it possible to see something I had not noticed clearly enough before – a possible connection between computer-wearing social networks of thinking, communicating humans and the swarm intelligence of unthinking (but also communicating) ants, bees, fish, and birds. Individual fish and birds (and tight-formation fighter pilots) school and flock simply by paying attention to what their nearest neighbours do. The coordinated movement of schools and flocks is a dynamically shifting aggregation of individual decisions. Even if there were a central tuna or pigeon who could issue orders, no system of propagating orders from a central source can operate swiftly enough to avoid being eaten by sharks or slamming into trees. When it comes to hives and swarms, the emergent capabilities of decentralised self-organisation can be surprisingly intelligent.

What happens when the individuals in a tightly coordinated group are more highly intelligent creatures rather than simpler organisms like insects or birds? How do humans exhibit emergent behaviour?

Kevin Kelly traced back the new theories regarding emergent properties to William Morton Wheeler, an expert in the behaviour of ants.[11] Wheeler called insect colonies 'superorganisms' and defined the ability of the hive to accomplish tasks that no individual ant or bee is intelligent enough to do on its own as 'emergent properties' of the superorganism. Kelly drew parallels between the ways both biological and artificial 'vivisystems' exhibit the same four characteristics of what he called 'swarm systems':

- the absence of imposed centralised control
- the autonomous nature of sub-units
- the high connectivity between the sub-units

- the webby non-linear causality of peers influencing peers.[12]

Steven Johnson's 2001 book *Emergence* shows how the principles that Kelly extrapolated from biological to technological networks also apply to cities and Amazon.com's recommendation system: 'In these systems, agents residing on one scale start producing behaviour that lies on one scale above them: ants create colonies; urbanites create neighbourhoods; simple pattern-recognition software learns how to recommend new books. The movement from low-level rules to higher level sophistication is what we call emergence.'[13] In the case of cities, although the emergent intelligence resembles the ant mind, the individual units, humans, possess extraordinary onboard intelligence – or at least the capacity for it.

At this point, connections between the behaviour of smart mobs and the behaviour of swarm systems must be tentative, yet several of the earliest investigations have shown that the right kinds of online social networks know more than the sum of their parts: connected and communicating in the right ways, populations of humans can exhibit a kind of 'collective intelligence'.

There have been various theories about the internet as the nervous system of a global brain, but Bernardo Huberman and his colleagues at Hewlett-Packard's Information Dynamics research laboratory have made clever use of markets and game simulations as computational test beds for experiments with emergent group intelligence. Huberman and his colleagues have used 'information markets' to perform experiments in emergent social intelligence. The Hollywood Stock Exchange, for example, uses the market created from the trading of symbolic shares to predict box office revenues and Oscar winners. They have found that group forecasts were more accurate than those of any of the individual participants' forecasts.[14] The HP research team makes the extraordinary claim that they have created a mathematically verifiable methodology for extracting emergent intelligence from a group and using the group's knowledge to predict the future in a limited but useful realm: 'One can take past predictive

performance of participants in information markets and create weighting schemes that will predict future events, even if they are not the same event on which the performance was measured.'[15]

Decades ago, computer scientists thought that some day there would be forms of 'artificial intelligence' but, with the exception of a few visionaries, they never thought in terms of computer-equipped humans as a kind of social intelligence. Although everyone who understands the use of statistical techniques to make predictions hastens to add a disclaimer that surprises are inevitable, and one of the fundamental characteristics of complex adaptive systems is their unpredictability, the initial findings that internet-worked groups of human beings can exhibit emergent prediction capabilities are potentially profound.

Another research group that takes emergent group intelligence seriously is the laboratory at Los Alamos, where a group of 'artificial life' researchers issued a report in 1998, 'Symbiotic intelligence: self-organising knowledge on distributed networks, driven by human interaction'.[16] The premise of this interdisciplinary team is based on the view proposed by some in recent years that human society is an adaptive collective organism and that social evolution parallels and unfolds according to the same dynamics as biological evolution.[17] According to this theory, new knowledge and new technologies have made possible the evolution of the maximum size of the functioning social group from tribes to nations to global coalitions. The knowledge and technology that triggered the jump from clan to tribe to nation to market to network all shared one characteristic: they each amplified the way individual humans think and communicate, and magnified their ability to share what they know.

The research conducted directly by the Los Alamos researchers reinforced Huberman et al's claims that groups of humans, linked through online networks, can make collective decisions that prove more accurate than the performance of the best individual predictors in the group. If it isn't a dead end, the lines of research opened by Huberman's team, the Los Alamos researchers and others could amplify the powers of smart mobs into entirely new dimensions of

possibility, the way Moore's Law amplified the powers of computer users.

Conclusion

Will self-organised, ad hoc networks of computer wearers, mediated by privacy-protecting agents, blossom into a renaissance of new wealth, knowledge and revitalised civil society, or will the same technological–social regime provide nothing more than yet another revenue stream for Disinfotainment, Inc.?

Or is that the wrong question? Given the direction of the technological, economic and political changes I have touched on, I propose the following questions:

- What do we know now about the emergent properties of ad hoc mobile computing networks, and what do we need to know in the future?
- What are the central issues for individuals in a world pervaded by surveillance devices – in terms of what we can do about it?
- What are the long-term consequences of near-term political decisions on the way we'll use and be affected by mobile, pervasive, always-on media?

Smart mobs aren't a 'thing' that you can point to with one finger or describe with two words, any more than 'the internet' was a 'thing' you could point to. The internet is what happened when a lot of computers started communicating. The computer and the internet were designed, but the ways people used them were not designed into either technology, nor were the most world-shifting uses of these tools anticipated by their designers or vendors. Word processing and virtual communities, eBay and e-commerce, Google and weblogs and reputation systems *emerged*. Smart mobs are an unpredictable but at least partially describable emergent property that I see surfacing as more people use mobile telephones, more chips communicate with each other, more computers know where they are located, more

technology becomes wearable, and more people start using these new media to invent new forms of sex, commerce, entertainment, communion and, as always, conflict.

Howard Rheingold is the author of Smart Mobs: the next social revolution*, from which this essay is extracted.*

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