Comparing the Android and Apple Operating Systems as Structuring Tactics in Cloud Surveillance

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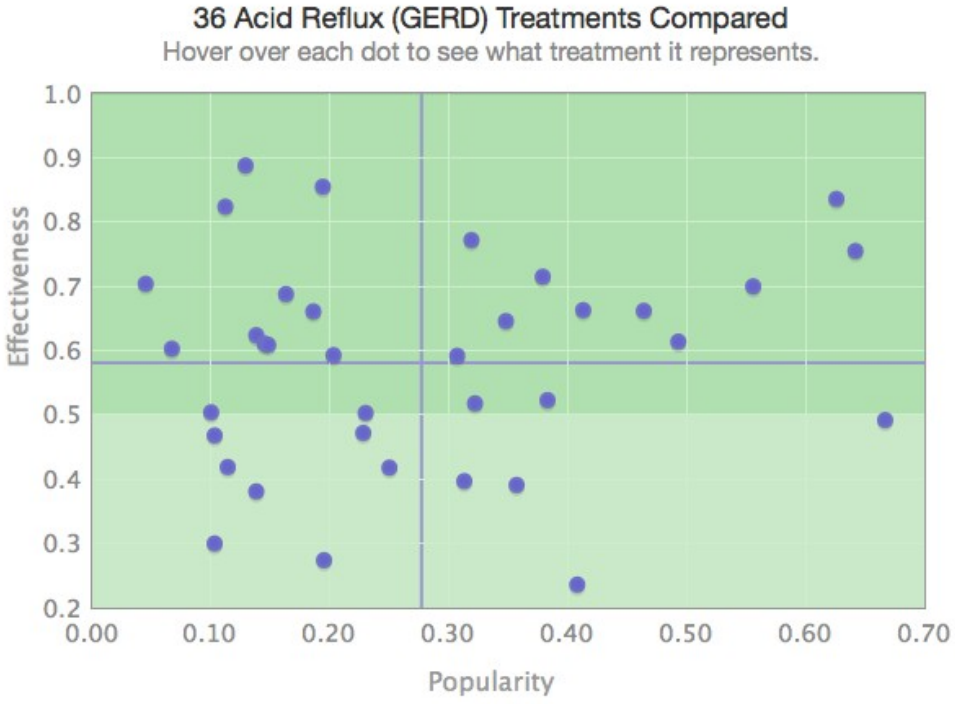
INTRODUCTION

This paper asks whether there is a possibility of an open, accessible infrastructure of surveillance, and more particularly, how closely Google approximates that ideal.

We should be clear at the beginning, especially in this group, what we mean by surveillance. Surveillance, for the purposes of this paper, is considered as a particular technique of knowledge production. Surveillant knowledge production requires several stages of activity. Members of a population are individuated and uniquely identified. Certain activities or actions are singled out for attention, each individual is monitored and tracked, and each performance of those activities is recorded. The accumulated data is subjected to statistical knowledge at the level of the population – groups, types, norms, and patterns are identified, created, or discovered. That knowledge is the applied back to individuals and the population as a whole. That is, individuals are treated in accordance with their relation to those discovered patterns. So surveillance makes populations as well as individuals visible.

Surveillant knowledge production is an exercise of meaning making - of semiotic power. It is in itself neither good nor bad. How surveillance is useful, and to whom, depends on the context of use. For example, we can see CureTogether as an example of a surveillance practice in which individuals can make sense of themselves in relation to a population in a way which preserves and enhances autonomy. Users of Cure Together, describe their personal experience of the effectiveness of various treatments of specific diseases. These are displayed on a graph with two axes: number of individuals taking that treatment and average effectiveness of treatment. It allows users to make sense of themselves in relation to the population. It is an exercise in semiotic democracy.



Notes

x-axis = fraction of respondents who tried a given treatment
y-axis = average rated effectiveness of a given treatment
vertical blue line = average fraction of respondents who tried each treatment
horizontal blue line = average rated effectivenss of all treatments

Treatments in the upper-left quadrant have below-average usage, but above-average effectiveness, so presumably more people should be trying these. Those in the lower-right quadrant have above-average usage but below-average effectiveness, so presumably fewer people should be using these.

<Figure: CureTogether >

http://curetogether.com/acid-reflux/ig/treatment-effectiveness-vs-popularity

(On the live site, mousing over each dot reveals the name of the treatment: endoscopic dilation, reduced lactose diet, AcipHex, etc)

CureTogether, though, is a very simple app, more or less single purpose. We wonder whether at a larger scale there such a thing as an open, available, common surveillance infrastructure. What would that look like? In our earlier work, we have suggested that

such an infrastructure would permit common access to grids, maps and measures, and to analytic and interpretive tools. It would also permit choices regarding the domain from which populations are constructed, and uses to which the knowledge is put.

We look at Google to compare their surveillance practice against these ideals. We choose Google for several reasons. First, they are an all but ubiquitous surveillance operation. Surveillance is their business. Second, their motto of "don't be evil" invites ethical analysis. Third, in many ways aspects of their platform seem to instantiate the ideals of democratically distributed semiotic power. Google Earth and Google maps, especially, seem to invite democratic, distributed, multi-purpose meaning making.

We will use the Android operating system as a point of entry into an analysis of Google's long term strategies of surveillance. Smartphones are an integral part of cloud computing, a burgeoning infrastructure of personal interaction and data exchange. The operating systems that control the handsets are an extremely important structuring element in that infrastructure. In seeing how Android mediates a certain kind of surveillance, we can gain some insight into Google's interest in particular structures of surveillance. As a comparative foil, we will also refer to Android's major competitor in the smartphone OS market – Apple's iOS.

In our analysis, we will draw on insights from surveillance studies, telecomm and information policy (especially with respect to open access, common carriage, and public utility), media studies (particularly the role of audiences in the political economy of mass media) and technology studies (particularly studies of infrastructure).

The paper addresses four questions:

- How is surveillance implicated in Google's strategy for profit? How does surveillance produce value for Google?
- How does Android OS mediate surveillance practice?
- What tactics, strategies, etc. support and maintain that configuration of surveillance power?
- In what ways does/can it support common access to surveillance power?

HOW IS SURVEILLANCE IMPLICATED IN GOOGLE'S STRATEGY FOR PROFIT? HOW DOES SURVEILLANCE PRODUCE VALUE FOR GOOGLE?

This section introduces the economics of surveillance as a technique of profit making and commodity production. It asks what google produces, how and from what materials that product is assembled, and how the product is distributed and marketed.

As is clear from their annual and quarterly reports, virtually all of Google's revenue (of 6.6 billion in the second quarter of 2010) is from advertising. Google produces audiences to sell to advertisers.

The raw material for the production of the audience commodity are the monitored and recorded traces of individuals interactions on the web. Google interprets those interactions as intent, and applies complex and proprietary algorithms to make inferences from them regarding taste, desire and habitus. The individual producers of those interactions are grouped and typified, and those groups are ranked, valued and commoditized as audiences. Access to those audiences is sold to advertisers.

This is basically the same economic model of the audience commodity that has underlain mass media economics since the penny press. Of course, while the general

economic model is old hat, the particulars of its instantiation are in some cases novel, and their configuration is unique.

The first detail which is a significant departure from the mass media model is that audience attraction and recruitment occurs through apps and services, rather than through entertainment. Far and away the most important attractor of the interactions from which audience is produced is Google Search, though all of Google's services – Maps, Earth, gmail, docs, YouTube – have the primary economic utility of amassing records of interactions, the raw material of audience production. This focus on interaction, rather than attention, as the primary raw material for audience production is not unique to Google. At least since the direct marketing industry, everyday transactions, traced through credit card records, loyalty programs, etc, have been the fodder for the production of economically useful demographic groups. And more traditional mass media audience producers, like the Neilson company, have been seeking ways to individuate mass media viewers, trace their interactions with media content (through eye-motion meters, for example), and link that with other sources of data regarding the individual's market behavior. However, Google has been able to gain a better quality raw material in several ways. First, because many apps require a gmail account, Google has been able to individuate the population more effectively, thus permitting finer analysis. Second, through their Google Analytics service, they have been able to extend the scope of their tracking capabilities beyond their own apps. Third, their Search service produces very precise data about individual desires and the cognitive links individuals make between one linguistic element and another. This facilitates inferences both about those desires and the ways in which individual thought and behavior can be influenced. These

inferences are extremely valuable to marketers, whose stock in trade is the creation and manipulation of desire. The strategic importance of this continuous monitoring and sense-making is evident as Google informs its employees that they "stake their bonus" on "integrat[ing] relationships, sharing and identity across our products."

Google has developed and patented several techniques for creating relevance ranks. These combine data from many sources. Google uses datacrawlers to garner textual hyperlinks among websites and combines these with data of individuals' interactions in order to create distinct measures of relevance between users and content. This permits the production of an audience more closely tailored to the advertisers' needs. These relevance algorithms determine which audiences are delivered to which advertiser, (or, conversely, which ads are delivered to which audiences).

Google employs two mechanisms for audience delivery. The AdWords service delivers audiences through Google's Search results page. Advertisers contract Google to have their ads appear next to Search results whenever certain keywords. Which ad appears to whom, and which audience is delivered to whom, is a function of the amount the advertiser has paid, the "keywords" the advertiser has specified, and the complex relevance ranking assigned to the individual searching and those keywords.

With the AdSense service, advertisers contract with Google to display ads, not on Google's network, but on "relevant" web sites with which Google is affiliated. Google contracts with web site owners to display ads. If the ad works (that is, if it prompts an interaction with the targeted viewer), the advertiser pays Google, and Google pays the hosting web site owner. Which ads appear on which sites, (or, again, which audience is delivered where) is again determined by the relevance ranking algorithms.

This relation between advertisers, audiences, Google's web sites, and Google's affiliate web sites is reminiscent of network broadcast economics. There, networks derive two income streams. They charge affiliates for programming, which the affiliates need to attract audiences. They also charge advertisers for audience delivery (that is, to show ads to assembled audiences). Networks pay producers for programming, and they pay affiliates to carry sponsored ads. The difference with Google is that they extract payment from affiliates and programmers, not in cash, but in the raw data of audience production. They monitor individual interactions with affiliates through the Google Analytics service.

To recap: Google's model of value and profit production is in some ways typical of all mass media. They produce audiences to sell to advertisers. However, the audience they produce is more fine-grained, and the social meanings they are able to create around those audiences is more closely linked with intent and desire. They deliver those audiences to advertisers using a network/affiliate model reminiscent of commercial network broadcasting.

HOW DOES ANDROID OS MEDIATE SURVEILLANCE PRACTICE?

The Android operating system can be understood as a tactic in Google's efforts to protect and extend its advertising income. Android is designed to push interactions onto the web, especially to web services operated by Google. This can be seen both in the underlying operational paradigm of the OS, as well as in the apps that come pre-installed with it.

Android's operational paradigm is intended to position Google within the emerging infrastructure of cloud computing. At its most basic level, cloud computing refers to any

network system in which individual computing terminals are able to remotely access shared data which is stored in large datacentres. As cloud computing becomes the dominant paradigm for personal computer use, terminals become dumber (often doubling as a mobile phone handset), data lines become faster and more capacious, and data storage and processing occurs at ever more vast datacenters. Institutionally, the terminals are produced by "smart phones" manufacturers, the data lines are operated by mobile phone networks, and the processing facilities are operated by behemoths like Google, IBM, and Amazon.

In general, Android is designed to support Google's position as a "smart" mediator among highly configurable apps and highly configurable terminals. In illustration, consider these capabilities of current and future iterations of Android, as touted at the public celebration of the launch of Android 2.2. Android can or will be able to cause an app to be opened on a remote handset. That is, one user could cause another's handset to open a navigation program to display directions. It will enable one user to access and download media from another's handset. It will include a personalization service mediating apps and devices and allowing those apps to configured on the fly to run on the devices. Such a mediating position again strengthens Google's ability both to monitor interactions and to mediate between advertisers and audiences.

As another strategy of reinforcing Google's core advertising revenue, Android comes with preinstalled apps that push users to Google's data operations. For example, the Verizon Android Incredible comes preinstalled with Google Maps, Latitude, Google Talk, Gmail, YouTube, Google Calendar, and Google Search. All are owned by Google and are part of its interaction harvesting operations.

Android is also closely linked to Google through users' gmail accounts, which are essential in order to use an Android handset to its full capacity. When Google offered it's own Android handset for sale (the Nexus One) it was impossible to order it without a gmail account. Google operates the Android Market, the largest clearing house for Android Apps. One cannot even browse the Market without a gmail account. Android's default contacts and calendar apps are referenced by gmail accounts. Presumably, inter-device operations and personalized app configurations are intended to be coordinated by gmail accounts. Again, this individuation of members of the population permits Google to produce more nuanced, refined and valuable audiences.

WHAT TACTICS, STRATEGIES, ETC. SUPPORT AND MAINTAIN THAT CONFIGURATION OF SURVEILLANCE POWER?

In order to maintain its position as the web's dominant purveyor of audiences, Google has had to protect the conditions that allow it to produce and distribute those audiences. That is, it must protect its abilities to monitor online interactions, to make sense of those interactions, and deliver access to the generators of those interactions. As cloud computing, mediated through smartphones, has emerged, those conditions have seen their biggest threat from Apple.

Apple's model for profit production are very different from Google's. Apple is promarily a retailer of terminals, such as the iPhone, the iPod, and the iPad. According to Apple's revenue report for the quarter ending 30 June 2010, almost half of its 15.6 billion in revenue came from sales of iPhones and iPads. However, it also has a significant interest as a distributer of cultural content, through the App Store and the iTunes Store. While the 1 billion it received in music sales may seem paltry by comparison to it's

harware sales, the profit margin on music sales far exceeds that on its hardware sales. In fact, since 2006, Apple has been the largest music retailer in the U.S. It currently surpasses the combined sales of both of its nearest competitors, Walmart and Amazon. Retail distribution of popular culture products is a significant source of income for Apple.

Apple's strategy has been to create a symbiotic relationship between these two interests by reinforcing its brand, and creating a "walled garden" such that the coolest content can only be had on the coolest terminals. iOS, the operating system for their terminals, facilitates this strategy. Whereas Android facilitates synching and sharing through web services, iOS synchs and shares through iTunes – not a web service, but a program running on a PC. Thus iOS, by design, avoids web interactions. Nor does iOS support much peer-to-peer networking. Until recently, it did not support multi-tasking. Only one program at a time could run on the iPhone. This meant, for example, that it was impossible to design an iPhone app that would, in the background, exchange data with other iPhones while still doing something useful in the foreground.

iOS will only install apps that are downloaded through Apple's AppStore, and Apple stringently vets the apps available there to ensure that they conform both to Apple's family-friendly brand and to technical restrictions designed to foreclose third-party platforms that extend or modify iOS in ways that Apple feels are detrimental to its longterm goals. iOS will only run on Apple appliances, like the iPhone, and those appliances can be "locked" to run only on specific telecomm networks.

This strategy, in which consumer cloud computing is basically an Apple-branded experience, and in which all interactions are mediated by Apple, is in direct opposition to

Google's interests. It has also been wildly successful. It is in response to Apple's success, and as an alternative to iOS, that Android was developed.

However, simply developing a compatible alternative to iOS was not sufficient to ensure that alternative's success. Infrastructural re-alignments were also necessary. To support app development, Google established the Android Market, a centralized point of distribution that facilitated the kind of sales volume necessary for developers to make a profit. It also alleviated the difficulties of app downloading and installation.

To weaken the bond between Apple and network carriers, Google entered the U.S. spectrum auction to ensure that the license stipulated that the licensee keep the spectrum open to any handheld communications device and enable any software application, service or content to be downloaded and utilized. To attract network carriers, many of whom were also threatened by Apple's ability to dictate the terms of engagement with the cloud, Google makes Android available in open-source and free of licensing fees. This makes it very attractive to handset manufacturers and to network operators who can reconfigure Android, adding features to make it unique to their brand. Carriers faced barriers to smartphone adoption because smartphones can be bandwidth intensive to an extent that taxes the carrier's network capacity. Google addressed this by diverting their commission from app sales through the Android Market to the carriers.

Apple is not the only source of threat to Google's profit engine. Facebook looms as the portal of choice – the attractor of the interactions from which audience is produced. In response, Google has entered into alliances with industrial producers and distributers of cultural content. For example, Google Earth integrates content from the BBC and

National Geographic (Lee 2010 922). YouTube partners with Universal, CBS, BBC, and Sony to distribute mass market music and videos.

To recap: While Google pursues its strategy of offering services to individuals in implicit exchange for traces oftheir interactions, they have also had to enter into retail markets for apps and handsets and to forge corporate alliances with manufacturers and network carriers in order to support the viability of Android as an effective alternative to Apple's iOS. In addition, they have allied with huge cultural product distributers to bolster their ability to attract interactions.

IN WHAT WAYS DOES/CAN IT SUPPORT COMMON ACCESS TO SURVEILLANCE POWER?

Now that we have an idea of how Google makes money, and the technical and corporate strategies it has pursued to protect that profit engine, we return to questions of how these structure the possibilities of semiotic democracy.

It might be argued that, at its best, the Google paradigm offers at least the possibility of a tremendously sophisticated knowledge production engine, noting patterns, pressures, and trends in a highly interactive, disperse and diverse technical structure, supporting interplay among lots of populations, devises, data, and applications. Ideally, and as reflected in Google's rhetoric, such a knowledge production engine might be generally accessible and adaptable to the needs of a wide variety of individuals and organizations.

But such a view neglects to account for the political and cultural economy in which Google operates. The basic tension is this: Google has an interest in supporting all kinds of interactions, to monitor and generate new kinds of knowledge, but only insofar as those interactions can used to produce a commoditized audience.

In *Manufacturing Consent,* Herman and Chomsky present the propaganda model, which predicts a narrowing of the realm of political and cultural discourse when that discourse is mediated by profit-seeking, advertiser-driven mass media. This final section will review some of the structural elements which the propaganda model identifies as hallmarks of global mass media, and the effects this structure has on political and cultural discourse. We then suggest how this model might be applied to Google.

Reliance on advertising

The model suggests that corporations that rely for their profit on producing and selling audiences will produce the kind of audience that advertisers want. This kind of audience has several hallmarks. They are produced as cheaply while still satisfying the needs of advertisers, and they are composed of constituents who are willing to buy, who frame themselves as consumers.

This suggests that customization – of apps, of handsets, of knowledge – will occur only insofar as it is profitable. Google's clients – advertisers – are interested in genres, brands, and predictable populations, not in bespoke applications or entertainments. They wish to capture not the attention of lots of individuals, but the zeitgeist. Advertisers and the culture industry will do their best to ensure that the cloud is instrumental in producing distributed, branded pop culture. Individuals will be addressed as interactive consumers, communities as fans and audiences. Google will facilitate this to serve their clients.

Ownership by large capitalist organizations

Google itself is one of the world's largest corporations. Network economics – economies of scale, network externalities – suggest that Google will continue its trend toward monopoly. In itself, this positions it as an attractive site for censorship and for

antagonistic targeting of individuals or groups by states or corporations (for example by monitoring dissidents or by tracking copyright infringements).

Google will also protect the core processes and resources that enable them to produce audiences for profit. They have been very savvy about branding of their look. They also patent aggressively their techniques of attracting and monitoring interactions, and making sense of those interactions, and delivering audiences. When patents or techniques are held elsewhere, they aggressively buy them.

Strategic alignments with other large industrial capitalist orgs

As mentioned in an earlier section, Google especially in the last few years has made extensive alliances with cultural producers, network carriers, and equipment manufacturers. Indeed, Google has shown a certain genius for integrating the interests of various industrial segments in such a way to be beneficial to each, as well as to Google. The propaganda model suggests that the interlinked interests of many facets of global capital will promote a kind of détente in culture wars. The interests of each industrial segment will be tempered in favor of a general support for the interests of the global capitalist class.

This is evident at a structural level in the ways that Google has in fact forced Apple to retreat in its strategy of controlling and branding all access to the cloud. Apple's clients – especially cultural producers who use smartphones as distribution channels – won't stand for losing Google (through whom they access audiences) or general accessibility to cloud. Apple has been forced to loosen its grip and recognize the interests of other industrial players.

Control of editorial policy by owners

The propaganda model suggests that when push comes to shove, owners retain the right to control editorial content. While that control is usually delegated to professionals to maintain an aura of objectivity, owners will step in in a crisis. Google explicitly retains the right to editorial control as far as possible, stating in its user agreement that "…your use of the Google Brand Features [that is, Google Earth, Maps, Analytics, …] will inure to the benefit of Google. You agree not to challenge or assist others to challenge the Google Brand Features (except to the extent such restriction is prohibited by applicable law)"

CONCLUSION

In conclusion, we restate our argument. Google is in some ways a typical mass media corporation. It produces audience to sell to advertisers. Thus we may effectively use analyses of the political economy of mass media to understand and predict the cultural and political ramifications of this form of profit-making. That analysis suggests that Google is also increasingly typical of mass media in the alliances, dependencies and market relations it enjoys with other industrial segments, particularly content owners and network distributers. Given this, we can expect surveillance in the cloud to operate much as market surveillance does now, in a cyclic process of individual actions informing the creation of structures which channel those actions to the benefit of global capital.

REFERENCES

My apologies for posting, at this very late date, a version immaculate of reference. A more complete version will be supplied soon. This entirely my fault, not that of my co-authors.

djp