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Impersonal Sociotechnical Capital, ICTs, and Collective Action Among Strangers

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The notion of “capital” suggests a resource that can be accumulated and whose availability allows people to create value for themselves or others. People can do more when they have access to physical resources like buildings and tools, which are usually referred to as “physical capital”. Money, or “financial capital”, allows people to acquire many other kinds of resources. In the latter half of the 20th century, economists began to think about education as “human capital”. People who have more knowledge and skills can produce more, so it makes sense to think about spending on education as a form of investment rather than consumption [1].

Productive resources can reside not just in things and in people, but also in social relations among people [2, 3]. Following Coleman [2], I define “social capital” as productive resources that inhere in social relations. In order to give the concept greater specificity, analysts sometimes restrict the definition to particular kinds of social relations, such as networks of interpersonal communication, trust, and intimacy, or widespread social trust¹, or norms of reciprocity. Equating social capital with any particular pattern of social relations, however, would make it impossible to identify as social capital any new patterns of social relations.

¹ Social trust, sometimes called generalized trust, is, roughly, the belief that most people are trustworthy, so that others are assumed trustworthy until proven otherwise.

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Social capital can facilitate useful interactions among people. It helps people connect with information and other people. It helps them share and exchange resources. It helps them coordinate interdependent actions. Perhaps most importantly, social capital can help people overcome dilemmas of collective action. One collective action problem is procurement of public goods, where people might free ride, hoping that others will supply them.² A related problem is the overuse of common pool resources, where individuals might consume more than their fair share, creating a “tragedy of the commons” such as overgrazing a shared pasture [4]. Another related dilemma of collective action is social mobilization, where everyone may realize that all will benefit if they all act, but individuals who act without others will fare badly, and no one acts out of fear that others will not join. Starting a labor strike [5] or starting the dancing at a party are examples of this problem.

Social capital can reside in many different kinds of social relations. Certainly, personal relationships can be productive resources, as suggested in the phrase, “it’s not what you know, it’s who you know”. Granovetter and others have noted that “weak ties”, those personal connections that involve less frequent interaction and less personal affection, are especially productive for some purposes, such as job finding, because they provide bridges to broader reservoirs of information and other information [6]. This chapter, however, calls special attention to social resources that are not based on personal connections at all, what I call “impersonal social capital”.

² Economists define a public good as one that is *non-rival*, meaning that everyone can enjoy it without reducing the benefit it provides to others, and *non-excludable*, meaning that if procured, it is available to everyone, regardless of their contribution to its procurement. Examples include roads, public safety, and radio and TV broadcasts.

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For example, “introducersystems” can generate personal ties when they are needed. In organizations, shared knowledge becomes a resource for shorthand in conversation, and established roles streamline decision-making and create legitimacy for decisions. In organizations and larger cultural groupings, shared values and a sense of collective identity make it easier to unite for a common purpose, and thus overcome problems of collective action. In markets, price signals identify mutually beneficial exchanges. Monitoring and sanctioning systems, whether emerging from individual action or organized by governments, can partially substitute for interpersonal trust in individual exchanges. Norms of generalized reciprocity, together with such monitoring and sanctioning systems, can help overcome problems of collective action. All of these are forms of impersonal social capital.

I use the term “sociotechnical capital” to refer to productive resources that inhere in patterns of social relations *that are maintained with the support of information and communication technologies* (ICTs). ICTs can be used to support personal relationships, as any teenage devotee of instant messaging can attest. But while ICTs can bridge time and distance, affective communication is more difficult through ICTs than face to face. ICTs are relatively more useful in supporting impersonal forms of social capital, where affective ties are not needed.

Elsewhere [7], I offer a systematic catalog of the building blocks that ICTs offer for establishing both personal and impersonal sociotechnical capital. This chapter highlights a few that are of particular relevance to impersonal social capital. It then explores potential transformations of important social enterprises, including news monitoring, electoral politics, and commuting.

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Some ICT Supports for Building and Maintaining Social Capital

One useful capability of computers is that they can search, sort, and select on the basis of geographic coordinates. In the United States, for example, street addresses can be looked up in a database to determine latitude and longitude coordinates. Using geographic coordinates, searches can be conducted, say, to find all the items within a one-mile radius or to select the 10 nearest items. In the United Kingdom, the UpMyStreet.com web site invites users to enter the postal code where they live or want to make connections. The site then not only displays local organization listings (schools, cafes, etc.), but also shows the messages contributed by people who live closest to that postal code. The system can scale well as more users participate: with few users, readers might see messages from people 100 km distant; with more users, they would make connections in their neighborhood.

Taste matching is another useful capability. Word of mouth normally travels from person to person in a social network. Recommender systems [8] can supercharge this process, allowing recommendation sharing among people who may not know each other or be explicitly aware of each other's interests. Computers provide support for gathering feedback about information, products, or even people, either in the form of explicit ratings or traces of behavior such as clickstream or purchasing data. For example, amazon.com gathers explicit book reviews from readers and also mines purchasing behavior to generate bestseller lists and links from individual books to other related books.

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Recommender systems can identify people who have similar tastes, simply by looking for similarities in their ratings, their clickstream behavior, or their purchasing data. Because the taste matching is automatic, people can get personalized recommendations from each other without ever establishing a personal relationship. Automated matching based on revealed tastes can also be used in a variety of situations for directly matching people for a variety of purposes, from dating to task group assignment to ride sharing.

A third function that ICTs can support is behavior monitoring through reputation systems. In large groups, it is hard for individuals to determine who to trust, and hard for the groups as a whole to encourage trustworthy behavior. This acts as an inhibitor to transactions that require risk-taking and to collective mobilization whenever there is an opportunity for free-riding. A reputation system gathers information about people's past behavior and makes it available to others. For example, at eBay and other auction sites, a buyer and seller can leave comments about each other after completing a transaction; these comments are visible to future buyers and sellers.

If people regularly provide honest feedback, and those with more positive feedback are treated better in the future, this can enable the maintenance of trust in a large online interaction environment [9]. Game-theoretic analysis suggests that this can be fairly effective, though not optimal, even if people remain anonymous and thus have the option of shedding bad reputations and starting over [10]. eBay is the most widely used site that relies on a reputation system: buyers and sellers leave comments about each other after transactions. Empirical analysis suggests that past reputations are somewhat informative in predicting future problems [11] and that buyers do reward sellers who have better reputations by paying higher prices for their goods [12].

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Areas Ripe for Transformation

Whenever a new way of accomplishing some function emerges, observers tend to notice first a substitution effect of the new for the old. Then there is what economists call an “income effect”: an increase in how much the function is performed overall because that function has become less expensive relative to other goods in the economy. Finally, new structures emerge that rely on cheap ubiquitous availability of that function. Malone and Crowston charted this progression in the realm of transportation (the horseless carriage; increased mobility; suburbs) and tried to anticipate it in the realm of coordination technologies [13]. The same framework can help us understand and perhaps even foresee potential impacts of technologically-mediated forms of impersonal social capital.

The first wave of changes should be a substitution of impersonal sociotechnical capital for forms of impersonal social capital that do not rely on technology. For example, eBay's reputation system is a partial substitute for legal enforcement of fair trade [14] and private, electronically-mediated dispute resolution services such as SquareTrade partially substitute for legal adjudication at substantially lower costs. Instead of markets, we see the emergence of barter systems with computers maintaining accounts so as to ensure equitable patterns of exchange over time [15]. Instead of long-lived organizations with clear external boundaries and internal roles and authority relations, we see ad hoc groups using ICTs to organize their efforts in areas such as technology standard setting [16], software development [17] and even public service projects such as NetDay's efforts to wire schools for Internet connectivity. [18].

The second wave of changes, the income effect, should lead to more reliance on impersonal social capital of all kinds, technologically mediated or not. For example,

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while personal connections are still valuable, computerized matching services are gaining prominence both for job placement (e.g., monster.com) and for dating (e.g., match.com, friendster.com).³ When choosing media, restaurants, and consumer products, people are turning increasingly to the “word of mouse” of strangers, on sites such as amazon.com, epinions.com, or movielens.org, not just the “word of mouth” of their friends.

The third wave of changes will be the emergence of new institutional structures and ways of life that that would have been impractical without impersonal sociotechnical capital.

These changes are harder to foresee, both because it has hard to imagine large-scale social transformations in general, and because it is difficult to evaluate whether a limited supply of impersonal social capital has been the key factor preventing these transformations until now. However, some hints of potential transformations are apparent in several arenas, as discussed in the following subsections.

News Monitoring and Opinion Formation

The news industry may be poised for a major transformation if more and more people begin to rely on advice from distant acquaintances and strangers to monitor the news and form opinions. The Internet has broken the mass media's near monopoly on publishing information about current events: there has been a proliferation of independent websites, and even publishing platforms such as indymedia.org. But most people still rely on the professionalized mass media to certify the accuracy of information and to indicate what is worth paying attention to.

³ Friendster relies on a social network to generate a pool of candidate matches (friends of friends of friends, etc.) But, as in other matchmaking services, the selection among candidates is based on pictures and text in profiles, and users contact each other directly. This means there is little dependence on friends to introduce people or vouch for them.

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Widespread use of recommender systems, however, has the potential to change this. For example, at Slashdot, a news and commentary site, there are often hundreds of comments about a story, but readers act as moderators by rating the comments up or down. By setting a threshold of 4 or 5 for which comments should be displayed, a reader can typically select less than a dozen comments about each story. Another site, kuro5hin.org, even lets the users choose which new stories appear on the front page. Similar technologies are being used to monitor what news stories are most linked to in weblogs, which often feature links to articles posted on other websites, with a bit of commentary. The first generation of tools is also available now for tracking which news stories receive most attention from readers (e.g., http://www.nytimes.com/gst/pop_top.html) or links from weblog "bloggers" (e.g., <http://www.technorati.com/cosmos/currentevents.html>). More personalized versions of these are likely to emerge, using recommender system technology to identify stories read or linked to by others who share one's own tastes. If a large number of readers begin to depend on these distributed recommending processes, rather than picking a few sources and relying on their editorial staffs, the levers of influence for shaping public opinion will shift considerably.

Grassroots Politics

Electoral politics may also be poised for a major transformation. For instance, an income effect was certainly been apparent in the lead up to the 2004 U.S. presidential primaries, with more reliance on impersonal social capital and less on mass media, mass mailings, or endorsements from prominent individuals. Early in October 2003, months before the first presidential primary, more than 70,000 people reportedly attended simultaneous informal events for Democratic candidate Howard Dean. Venue selection for these was

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made by attendees themselves, coordinated through the website meetup.com. Candidates have shown greater commitment to energizing a large base of volunteers and small contributors than in any campaign in the previous few decades.

What will electoral politics look like if the current activity is the beginning of a longer term trend? We could see a return to grassroots political organizing for both presidential and local campaigns. Rather than an old-style ward organization, however, with favors traded among people who have established personal loyalties, we should expect to see a looser network, with information sharing and mobilization of coordinated action mediated by ICTs.

Moveon.org may be a harbinger of such a future. More than 2 million people have signed up through its website. Members participated in a discussion period and straw poll among Democratic presidential candidates. Members receive email alerts soliciting donations to fund specific political advertisements, signatures on petitions, and calls to congress. There was even a distributed phone bank system to allow members to make phone calls to California voters prior to the gubernatorial recall election in 2003. Close friends or co-workers could easily be active members of moveon.org without knowing of the other's membership. Once people have joined, personal connections are not critical to any of the forms of participation.⁴

⁴ This suggests, of course, that there are probably opportunities for moveon.org to be even more effective if it also tapped into more personal forms of social capital in organizing its political activity. For the purposes of this chapter, however, the remarkable thing to notice is how much grassroots political action can be organized without either personal connections or formal organizational structure.

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Semi-public Transportation

In the United States, there is tremendous unused transportation capacity in the form of unoccupied seats in private vehicles.⁵ Not only would filling some of those seats reduce smog, congestion, and fuel consumption, but it also could create opportunities for increasing local social capital as people conversed in the car. The major barriers to ride sharing include coordination of routes and schedules, safety risks, social discomfort with sharing what are currently private spaces, and an imbalance of costs and benefits among the affected parties. Despite these barriers, ride sharing does occur. More than twice as many people in the United States share a ride to work in a private vehicle as use public transportation to get there [19], either informally or through formal carpools and vanpools.⁶

In a few cities around the United States, ad hoc ride sharing among strangers has emerged to enable drivers to use high-occupancy vehicle (HOV) lanes. For example, thousands of commuters from Virginia suburbs to Washington DC regularly use a completely informal system called “slugging” to fill cars in order to make use of HOV lanes. To solve the coordination-of-routes problem, conventions have evolved among drivers and riders for pickup and drop-off points. Often, pickup points are at or near public transportation stops, so that riders can fall back on public transport if there are not enough drivers that day.

Commuter parking lots along highways, originally designed to support regular car-pooling (Park ‘n’ Ride), are also popular pickup points. But sometimes restaurant parking lots are used, or indeed any place with space for cars to pull over that is near an HOV

⁵ Based on a 1991 survey, the mean occupancy for trips to work was 1.14 passengers and the mean occupancy for trips was 1.63 [19].

⁶ Less than 5% used public transit to get to work. More than 90% used personal vehicles. The mean occupancy for “work” trips was 1.14. Thus, 11% of commuters were passengers in personal vehicles (and perhaps as many as 11% of drivers had passengers).

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entrance. There are a limited set of destinations and their meaning is well understood (e.g., "Bob's" refers to the parking lot of a restaurant that used to be Bob's Big Boy, but no longer is) Generally, there is no signage: regular users just know where to go.

Conventions have also developed to address the problems of safety risks and social discomfort [20]. Generally, riders or drivers line up and are matched in order of arrival, but either party can refuse the first rider or driver in line if they feel uncomfortable.⁷

Riders normally arrange not to leave behind a lone female, allowing her to go ahead of the last male rider if necessary. To alleviate social discomfort, the illusion of private spaces is generally maintained. Riders are expected not to initiate any conversation, and need not respond to conversational overtures from the driver.

I am not aware of any news stories or web sites reporting any serious safety incidents such as rape, kidnapping, or murder. The system is not completely successful, however, in preventing unhappy matches. On the DC website slug-lines.com, the most common story is a rider's tale of an unpleasant ride: the driver didn't go to the promised destination, drove in an unsafe manner, or left something on the seat that soiled the rider's clothes. Posted stories involving the breakdown of the illusion of private spaces are generally happier ones: reunions of long-lost friends or finding that driver and rider's high school social networks had significant overlaps.

It is doubtful that transportation planners who wanted to encourage HOVs envisioned the instant matching that is occurring of riders and drivers who do not know each other. In fact, public officials sometimes discourage the practice. There are concerns about public safety, so much so that the Houston Metro Police Chief [21] opined, "We think the No. 1

⁷ In two hours watching at one location, I never saw a vehicle or passenger passed over, so there may be a strong social norm against this.

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safety tip would be: Don't do it. “ The meeting points can create congestion problems and slow down public bus service. Some of the passengers are siphoned off from using (and paying for) public transportation, which hurts the viability of that enterprise. In fact, the term “slug” for people seeking shared rides apparently was first coined by bus drivers who would pull over to pick up bus riders only to be waived on, which they viewed as analogous to a bus rider using a fake coin, or slug, instead of paying a fare [20, p. 22].

Technology-based monitoring and reputation systems could reduce some of the trust problems inherent in ride sharing with strangers. A computer system could authenticate drivers and riders, and give them one-time codes to say to each other. Deviations from expected routes could trigger phone calls to confirm that nothing had gone wrong. Far more likely than actual violence is the kind of unpleasant ride described earlier. Here, a reputation system would be far more useful than posting horror stories on web sites.

Passengers could refuse rides from drivers that other passengers rated as unsafe, and drivers could refuse to take passengers with a history of rude behavior.

Technology could also be used to coordinate the matching of rides to riders. For example, suppose riders and drivers had easy interfaces for entering their destinations. As a first step, drivers approaching a slug line might be able to identify quickly a waiting passenger wanting to go close to the driver's final destination, rather than the usual drop-off point.

That would get the passenger closer, and avoid a drop-off stop that may be slightly out of the way for the driver. Now imagine that drivers and riders had a Global Positioning System (GPS) or other location-sensing devices that could monitor and transmit their locations to a central coordinating computer. That could enable pickups at points other

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than well-used slug lines, allowing more people to slug from home rather than first driving to a central pick-up point.

As housing and jobs sprawl over larger areas, and consumer tastes for convenience and privacy change, advocates of public transportation are fighting an uphill battle to maintain and improve systems. If enough people participate in ad hoc ride sharing, it could become more convenient and reliable than today's public transportation systems. During a transition period, public transportation will almost certainly be needed as a backup system around which ad hoc ride sharing can crystallize (many slugging routes in DC and elsewhere duplicate public transportation routes and use bus or subway stops as pickup and drop-off points). Eventually, however, impersonal sociotechnical capital may lead to a system of semi-public transportation in private vehicles that replaces public transportation entirely.

Conclusion

Much of the public discourse about social impacts of the Internet has focused on sociability. It is important to understand how mediated communication displaces, substitutes for, and complements face-to-face interactions, and how that impacts family and friendship. This chapter has argued, however, that larger structural transformations in society are likely to arise from new forms of organized interaction among strangers that ICTs can enable.

These transformations are not inevitable. For example, major engineering and incentive issues would need to be overcome to make a system of semi-public transportation a reality. Entrenched forces, such as car companies and public transit employee unions, might organize against ad hoc ride sharing (see [22] for a fictional, humorous report of

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such opposition). A few well-placed scare stories and nuisance regulations might be sufficient to prevent a critical mass of adoption that would be necessary to make the system reliable.

Nor are these transformations inevitably good for society. For example, distributed news monitoring may be subject to even greater manipulation than are today's mass media.

And such manipulations may be less easily detected and counteracted.

While large-scale societal changes are neither inevitable nor inevitably good, it is worthwhile to try to anticipate where they might occur. It is helpful to begin by examining the changing capabilities and cost structures for coordinating activity. With impersonal sociotechnical capital, connecting happens without personal connections and organizing without organizations. Over centuries, the process of modernization has included more and more coordinated activity among strangers, abetted by industrialization, urbanization, and the growth of government. ICTs are ushering in the next chapter in that process.

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