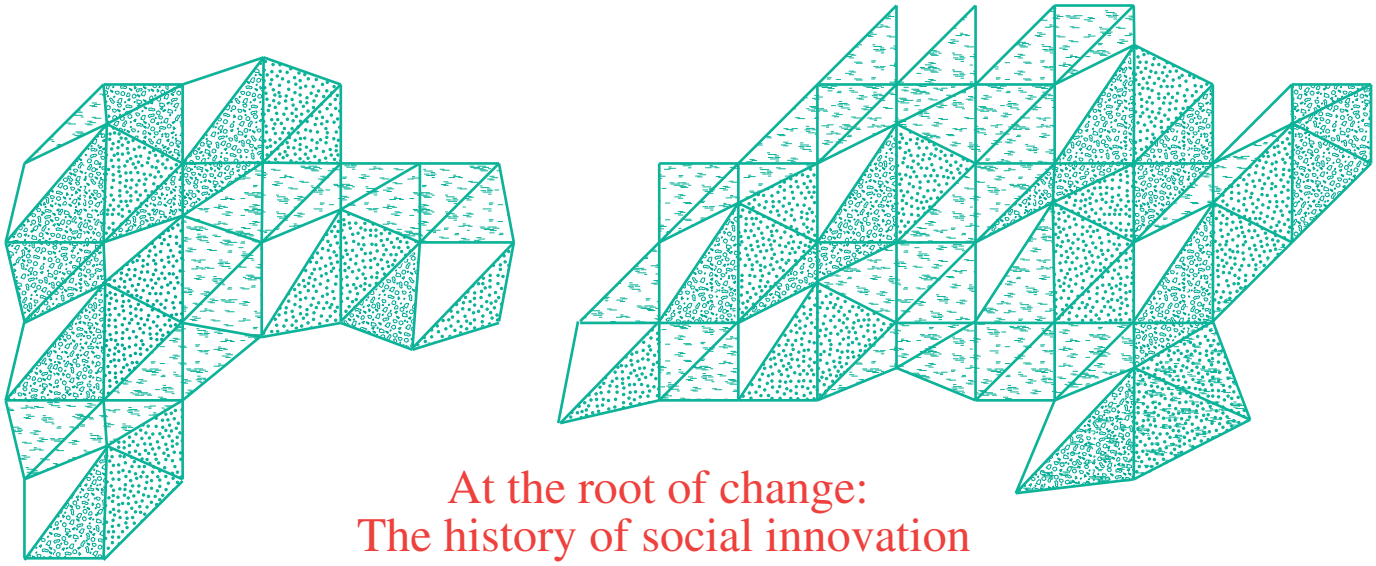

At the root of change: The history of social innovation

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Abstract

This paper introduces a new theory surrounding the process of social innovation using historical case studies. Using the particular example of the lifecycle of the intelligence test over the first half of the twentieth century in the United States, we discuss the hypothesis that the discovery/definition of new social phenomena (naturalistic, constructed, and technological expressions of what we can, ought or will do, that direct or influence behavior) and combination of new and extant phenomena provide the necessary intellectual space and impetus – through glimpses of what could be, seen through the lens of new social phenomena – for the creation of clusters of inventions and innovations. One or more of these innovations, when scaled up or out, can ultimately shift an entire system. This process requires the work of multiple actors, occupying three general roles, the poet, the designer and the debater. Historical data suggests these agents act on both the niche and landscape level, and can travel effectively between them, spotting approaching windows of opportunity to create pathways to their desired adjacent possible, while incubating new social innovations. These observations are based on a comparison of a growing body of historical cases of social innovations.

1 Introduction

This paper introduces a new hypothesis that explores the roots and developments of social innovation through comparative historical case studies. Specifically, this paper will introduce the theoretical and methodological framework for this historical discussion, several preliminary trends we have observed, and a more detailed discussion of one specific case, the emergence of the intelligence test, to explore the key dynamics that have emerged in the early stages of research and comparison. These include: new ideas' shift the intellectual landscape, and create the space for novel combinations; the complimentary and compiling efforts of poets, debaters and designers (different roles for agents), and; the importance of agents' functioning at both the niche and landscape level. Social innovation, unlike technological innovation, is driven by the changes in ideas and discourse over time. This paper, as part of a larger project, examines this process: the discovery/definition of new social phenomena (naturalistic, constructed and technological) provide the opportunity for the creation of clusters of inventions and innovations. This opportunity is a glimpse of the adjacent possible – the scope of possible social arrangements one degree removed from current realities (Kaufmann, 2000). These innovations and inventions can ultimately shift an entire system, potentially moving to a place of greater resilience, and rooting those new social phenomena as core ideas in the new iterations of the system in question. The new ideas – new social phenomena (rules about our social, natural and/or technical world) – spark exploration, invention and innovation. Wallerstein (1974) argued truth changes because society changes, but we suggest as new truths emerge and compete for dominance, it creates the space for society to follow suit.

2 Research Methodology

Geoff Mulgan (2006) points to the "radical innovation" origins of much of our current lives. Although Mulgan sees social innovation as a response to modernity's twin pillars, industrialization and urbanization, many radical ideas that shifted society emerged long before the 18th and 19th centuries, some of which are still embedded in our society while others have been displaced in Popper-esque fashion. History allows us to observe patterns and disruptions across multiple scales. This level of holism is the goal of many contemporary studies of resilience and complexity (van der Leeuw et al, 2011), a well-constructed historical map can achieve something like this because "historically we can see what happened" (Byrne, 1998: 26).

Berks and Folke (1998) argue the characteristics of complex systems *require* a case studies. Several excellent studies have employed historical cases in their research into complex systems (Gunderson et al, 1995; Berkes & Folke, 1998; Ommer, 2007; Redman & Foster, 2008; Bures & Kanapaux, 2011). In the raw, history provides a rich resource for those looking to understand social processes, but there is equal risk of over-emphasizing detail, context and specificity, as there is of imposing rigid theory on the messy complexity of human systems. In complex systems, information and behaviours do not necessarily scale up; activity at the micro-level does not simply add up to produce outcomes at the macro level and one does not explain the other. Hence the benefit of preforming multiple cases, with replication in questions and design, to allow cross-case comparison (Yin, 2003). Multiple cases allow the researcher to dig deep into the dynamics of one case, bounded in time and space, but "always considered within the broader concerns of the overarching research question" (Ommer, 2007: 26).

Case Selection. At this stage of our comparative historical project, we have completed case studies on the development of the internet, financial derivatives, the national parks, birth control, the intelligence test, the Dutch East Indian Trading Company, Canada's Indigenous (Indian) Residential schools, and the Canadian Health Care System. Our selection of cases incorporates a broad spectrum of inventions and disruptions, including: the American national parks systems, the internet, financial derivatives, contraception, intelligence testing, and the Dutch spice trade.

This is an exploration: were there common mechanisms or trends across disparate disruptive shifts? We began by identifying a significant institutional shift (such as the introduction of a new law). Looking at these discrete moments, we asked what were the goal(s) of this new legislation or institutional change (rather than the result, for instance), and we looked for the windows of opportunity that made this change possible. Therein we looked for new ideas: we considered both the description/discovery of new ideas and the convergences of new and existing ideas and trends, and asked if any of these new ideas constituted a new social phenomenon.

3 Theoretical Framework

Social innovation is of increasing interest in the discourse of wicked problems, limited resources, and ingenuity gaps (Rittel, 1972; Westley, Patton & Zimmerman, 2006; Bason, 2010; Homer-Dixon, 1995). Despite its veneer of novelty, humans have experimented and achieved disruptive, durable change repeatedly – social innovation is a common dynamic of human story. This is especially important from an analytical standpoint, as the number of historical examples increases our pool of social innovations exponentially, allowing us to test multiple theories and look for overarching patterns and commonalities across cases. The theoretical framework we employ to compare historical social innovation is composed of three broad categories: the driving force of new (and new combinations of) ideas into the adjacent possible; the compilation of agents' activities; and the importance of the niche and landscape level.

3.1 New Ideas, Novel Combinations

Combination is commonly acknowledged as a key mechanism in technological invention, and scientific discovery, and similarly bricolage as a key mechanism of innovation generally (van den End & Kemp, 1999; Becker et al., 2006; Arthur, 2009; Biggs et al., 2010; Thagard, in press). Brian Arthur (2009) suggested new technologies and technological domains emerge as the result of the discovery of new naturalistic phenomena (see below), as well as through the combination of existing technologies within and across domains. Similarly, looking at 100 scientific discoveries and 100 technological innovations, Paul Thagard (in press) sought common features of how individuals involved in those breakthroughs had perceived and/or created novelty. Thagard credited combinations of mental representations as the most common, compelling explanation for the creative process.
This study considers a social dimension of the combinatorial hypothesis of invention. We examine how the emergence of new social phenomena (discrete new ideas about society, nature, technologies, processes and/or the individual) creates the opportunity for new and/or re-interpretations of social arrangements, and of human behavior, individually or collectively. These new social phenomena allow for glimpses of the "adjacent possible," the range of alternative social arrangements just beyond the horizon of prevailing practice (Kauffman, 2000; Johnson, 2010). Translating this glimpse into action, agents create new processes, products, programs and eventually policies, all or any of which can produce deep shifts in complex social systems. The exploration of the adjacent possible is a key dynamic of social innovation.

We propose three general categories of social phenomena: naturalistic, constructed, and technological. Naturalistic phenomena are primarily discovered in the realm of science. An example of a new and transformative naturalistic phenomenon was the discovery of the microbial cause of cholera, which replaced the miasma hypothesis, and arose from discrete observations were strengthened through data collection of men such as John Snow (Johnson, 2006). Constructed phenomena are concepts that a discrete group (a culture, a sect, a political group) believes to be true and guides their behavior accordingly. These reflect an earlier sociological concept – the social fact – ideas/rules/beliefs that are real in their effects (if not always strictly tangible or falsifiable), and constrain or direct our activities (Durkheim, 1912; 1968). Technological phenomena consist of individual technologies (a car, a computer, although both are composed on subsidiary technologies) and technology regimes. New technologies can enhance our ability to engage with the natural world, or achieve insights into the workings of our own bodies. Similarly, new technologies or technology regimes such as the internet can affect how we live, and how we interact, organize our economies and affect the flows of power.

3.2 The Heterogeneity of Agency

The social innovation process is the result the interaction of agency and institutional dynamics (North 1990; McCallum et al., 2009). In our exploration of historical social innovation, we further distinguish agents' behavior and roles into three categories (adopted from Alex Himelfarb, 2013) – the poet, the designer and the debater. These are agent 'roles' (an agent can transition between roles), and the success of a disruptive social innovation relies of the cooperation or compilation of their efforts at specific moments and over time. The poet shapes or expresses the new idea or social phenomenon, the designer converts the phenomena into an innovation (a policy agenda, a program, product, etc), and the debater advocates for either the innovation, the new phenomenon or both. The debater is the historical systems entrepreneur, who champions an innovation through the system, convening different stakeholders and interests, and "finding the opportunities to leverage innovative ideas for much greater system impact" (Westley, 2013). The roles of designer and poet are not directly translatable to the existing concepts of social entrepreneur as defined or discussed in business or social change literature (Peredo & McLean, 2006; Mair & Marti, 2006; Bornstein, 2007; Gunn & Durkin, 2010; Abu-Saifan, 2012). Perhaps this is a function of the difference in breadth between the concepts. The poet, who first observes and/or describes a new social phenomenon, is not necessarily tied to the social innovation or social change process. Instead, that role falls on the designer, who sees the opportunities created through the adjacent possibles opened through the description of this new phenomenon.

For instance, the early 19th century romantic artists and explorers who first praised the 'pristine' and distinctive quality of America's interior did not themselves decide that large public parks were the appropriate means to protect and share that experience. Their celebration of wilderness was the inspiration for the creation of the first national park at Yosemite during the American Civil War. It took the combined work of men like landscape architect Frederick Law Olmsted (a designer who wrote a manifesto for parks) and businessman-turned environmentalist John Muir (founder of the Sierra Club) to lobby the public and government to create a system of parks open to the entire American population. Poets, designers and debaters built on the work of each other to create disruptive change.

3.3 Scale

To achieve the sort of broad, lasting change associated with social innovation, that change must cross multiple scales (Westley et al, 2011). Scales are not impermeable layers, but are relevant in the "reflexive relationship whereby action is constrained and enabled by structure, but through reflexive feedback, structures are also changed by agency" (McKay & Tambeau, 2013: 676). Cross-scale cross-case comparison proved initially problematic. Unlike some of the interesting examinations of socio-technical transitions from the DRIFT group using their niche, regime and landscape framework (Geels, 2006; Geels & Schot, 2007), our cases considered highly variant problem domains, geographical domains (regional, national and international) and temporal scales, which made defining a common "regime" or a similar meso-level of analysis difficult across cases. This problem of geographical scale and defining regimes has been remarked elsewhere as well (Smith, Voss & Grin, 2010), although this might in part reflect the broader focus of this study into social innovation (including technological innovations) rather than the specific focus of the socio-technical transition literature. The landscape and niche however proved critical in understanding the movement of ideas to open the adjacent possible.

The landscape was comprised of the "backdrop that sustains society" (Geels & Schot, 2007: 403) ranging from the physical environment to the "political constellations, economic cycles, and broad societal trends" (Westley et al, 2011). Borrowing from the Resilience Alliance's heuristic discussion of resilience, we describe basins of attraction across the landscape (Walker et al, 2004), deepened by landscape conditions, the collection of resources, and the influence of overarching 'big ideas' (such as democracy, capitalism, scientific progressivism) that maintain stable states within that broader landscape. We also identified the importance of historical niches, protective spaces where agents exchange ideas, experiment and explore relative possibilities.

Building on the assertion that a disruptive innovation can trigger the transition of a system from one basin of attraction to another, and that an institutional or systems entrepreneur can also lower the thresholds between proximate basins (Hwang & Christensen, 2007; Westley et al, 2011), we sought historical examples of this dynamic within our cases. What we found was the ability of agents to travel between the niche and landscape level to be able to aid critical transitions and advocate for their particular innovation. In the case of the World Wide Web, we found that designers (frequently programmers) often considered what could be done technologically (working in research institute niches for instance), but also what *should* be done. The latter question was a landscape-level concern, as designers like Ted Nelson (*The Computer Manifesto*) sought to create an open, egalitarian web, which reflected their political/social values broadly.
Hence, the theoretical framework we develop encompasses both agency and structure, and innovation and exploration as a dynamic thing, both spontaneous and contingent as well as deliberate and thoughtful. We seek to understand not just the conditions that favour disruptive change but the behaviours that encourage it; the important actors and milestones as well as the life cycle of an idea to innovation to disruption to orthodoxy and beyond.

4 The Intelligence Test: an explanatory case

The creation of the intelligence test was a specific solution to a concern about how to arrange people in an emerging modern meritocracy and industrial economy, grounded in the growing faith in scientific progressivism to improve society and individuals. The particular scientific or pseudo-scientific basis for the tests relied on a combination of inheritance, and social Darwinism, as well as new scientific techniques that facilitated repeatable mass testing. There were two poets, Sir Francis Galton (the creator of Social Darwinism) and Alfred Binet, who articulated mental capacity as "intelligence." The designers however experimented with the potential of testing mental capacity beginning two decades before Binet debuted his test in 1911, and continued to refine Binet's test for years to come. Two key debaters advanced the idea of testing in America, Henry Herbert Goddard, a psychologist who worked with the "feebleminded", and Robert Yerkes, a psychologist whose chairmanship of the National Research Council during the First World War allowed him to successfully advocate for testing for all American army recruits. Each of these designers worked in their niche laboratories, and the most successful debaters were able to see the policy implications beyond their lab, and read signals of potential landscape shifts as opportunities to advance the use of the intelligence test.

4.1 New Ideas, New Combinations & Adjacent Possibles

There were two key new naturalistic phenomena (re)discovered in the 19th century that had foundational effects on education and the treatment of children. First, Darwin's description of natural selection, that "works solely by and for the good of each being, all corporeal and mental endowments will tend to progress towards perfection" (Chitty, 2007: 25). Second was the rediscovery of Mendel's rules of genetic inheritance, specifically heredity. Could science help build a better society, and validate the extant social hierarchy based on merit and possibility?
If humans were genetically different (eye colour, height, i.e.), some reasoned the same could be said for character, for intelligence and achievement, as well as social problems such as crime and poverty (O'Brien, 2011). Darwin's second cousin, Francis Galton (a poet for scientific progressivism's ability to improve society, and rank humanity according to measurable merit), applied natural selection to explain social striation: those who enjoyed the spoils of society were closer to "perfection" than their lesser fellows (Chitty, 2007; Dudziak, 1986). This 'Social' Darwinism mixed scientific-social validation of a class-based society (inequality of situation and opportunity), combining naturalistic and constructed phenomena. So emerged a new adjacent possible: specifically, might heredity and science build a better population? These views defined the intellectual niche of Eugenics, the science of improving the "quality" of humanity (Chitty, 2007). "Better" meant racial purity, and was usually seen from a middle or upper middle class Protestant perspective, borrowing elements from Malthusian are Darwinian theory (Dudziak, 1986; Zenderland, 1998).

Among many concerned with social improvement in the late 19th and early 20th century, a significant threat to public safety and social progress was the "Menace of the Feebleminded" (Samelson, 1987: 114). If "better" was possible, so too it must be possible to eliminate society's least desirable, specifically those labeled "feebleminded." According to the view, the feebleminded posed a several-pronged threat (reflecting in part the confused and flexible definition of feeblemindedness): they were incompetent (and idle) so they did and could not contribute to the economy, collectively and individually they represented a threat to public health and morals as they were liable to commit such sins as "promiscuity, adultery, incest, crime and alcoholism" (Dudziak, 1986: 845; Zenderland, 1998). Thanks to the combination of these social views with the naturalistic phenomena of inheritance, negative behaviours were perceived as the result of bad genes, and therefore fixed more than environmental.

4.2. Innovation(s)

The belief that the differences between people, including ability, character and intelligence, are measureable and determinate, opened up a significant possibility for educators (an adjacent possible). Progressives had campaigned for decades for technical and scientific expertise in designing, implementing and evaluating public policy (Cravens, 1987). Within this broader debate about the direction and content of the public realm, the education regime in North America and Western Europe was undergoing a fundamental pedagogical shift, from philosophy to psychology (Blanton, 2000: Cravens, 1987). Education had become the state's purview in many Western countries, and education officials sought to take advantage of the new scientific quantitative measurement methods to effectively and definitively test and stream their student bodies (Chitty, 2007).
To address the concerns of feeblemindedness in schools, an association of American teachers established special education programs 1902 as an innovation to tailor education to the limitations or specific needs of a class of students (Zenderland, 1998). But to educate the feebleminded, there needed to be an effective, reliable method of sorting the student population. Education officials sought to take advantage of the emerging statistical study of human populations (a new technological process), especially the permanent census (Ramsden, 2003). The ability to collect and process large amounts of data about a state's population informed many aspects of the growing state's responsibilities, including the management of the classroom. There was competition between different types of tests, and different assumptions of how hereditary intelligence could be measured, but most failed to scale beyond the small niches in which they developed (Sokal, 1987).
The poet (and designer) in the case of the intelligence test was Alfred Binet. Binet devised the first reliable test of children's cognitive capabilities (based on the twin assumptions that ability is based on genetic inheritance rather than environmental factors, and that it can be mapped systematically over time) to distinguish the mentally incapable from those failing for environmental, rather than genetic reasons (Chitty, 2007; Zenderland, 1998). Instead of looking for physical or behavioral cues for mental capacity (previously the dominant means of, the tester should look to cognitive capacity alone – hence the concept of intelligence, itself a new naturalistic phenomenon that rooted his innovation of testing for Intelligence Quotient (I.Q.) (Zenderland, 1998). Those children whom the test "objectively" indicated were "feebleminded" could be institutionalized, a separation believed to be for the best interest of themselves and society generally (Blanton, 2000: 1016).

4.3 Scaling towards a Tipping Point & Mass Adoption

In this case, one key debater for the intelligence test, and intelligence as a naturalistic phenomenon was Henry Herbert Goddard. Goddard was a psychology, Director of Research at the Vineland Training School for Feeble-minded Girls and Boys in New Jersey, a niche that allowed him to experiment with different tests. Goddard was perpetual advocate for intelligence testing and the role of psychology in education, successfully shifted the narrative of feeblemindedness in America to a question of intelligence (Zenderland, 1998). Goddard advocated for the theory that "feeblemindedness" was the result of intelligence (or lack thereof), and a simple test could differentiate these children from the broader class. He was able to convince American doctors working in institutions for the feebleminded to "redefine mental deficiency in terms of intelligence" (Zenderland, 1998: 104). Goddard's advocacy work broadcast Binet's ideas and processes linked with I.Q., and achieved medical and institutional legitimacy for intelligence tests (Zenderland, 1987).
At first, the solution to "feeblemindedness" was institutional segregation. Advocates believed

that a good institution could even train the "feebleminded" to "go out into the world and support themselves," but that would only be allowed once surgical techniques allowed for safe sterilization of the "feebleminded" to remove "the terrible danger of procreation" (Zenderland, 1998: 181-182; Dudziak, 1986). If "feeblemindedness" was inherited, then removing any question of genetic transmission could remove the major threat the "feebleminded" posed to society.

4.4 Disruptions, Social Shifts

The intelligence test quickly facilitated another form of social control on the "feebleminded." Specifically new medical technology allowed for safe sterilization of those deemed feebleminded. Beginning with Indiana in 1907, 28 states introduced compulsory sterilization laws (although it was not until the case of Carrie Buck in 1925 than any of these laws were upheld at the state supreme court level) (Dudziak, 1986). Mass testing also validated racial assumptions about the hierarchy of races. Binet explicitly did not want his test to be used to rank people beyond separating those who fell below a certain floor and could benefit little from conventional education (Blanton, 2000). Once the process was available however, it was quickly seized on to differentiate people based on intelligence and race. Lewis Terman (another designer) adopted Binet's test beyond children in 1916, which facilitated the work of Robert Yerkes, another key debater in the adoption of the intelligence test. Like Goddard, Yerkes was an American psychologist; Yerkes believed science could validate and inform a merit-based hierarchy of people based on their ability/potential contribution to the economy (Kevles, 1968). Yerkes was the Chairman of the National Research Council in the United States, a position that put him in direct contact with key powerful individuals within the American Military.

America joined the Allies in the First World War in 1917, and needed to raise a large (and largely civilian) army quickly – Yerkes saw this as an opportunity for psychology generally and intelligence tests specifically to demonstrate their utility in evaluating human potential quickly and efficiently. Specifically, Yerkes convinced the Surgeon General of the Army of the potential of testing for its new recruits as the country quickly expanded its forces for combat in France (Keyles, 1968). Although this process was not without problems[1] (Blanton, 2000; Pinter, 1926), tests on this massive scale (half a million men underwent the test) validated both the test, and the concept behind it - intelligence. In 1919, the *Lancet* declared "Intelligence, of course, is only one of the factors in military efficiency, but it is probably the most important single factor," and thanks to the war, intelligence tests had given "clear indications of their future value in the work of human selection and vocational training" (539). The link between eugenics and race is Nazi Germany, but it is hardly the only example. Perhaps the most instructive case is the mass I.Q. testing Texas used to affirm their belief in a hierarchy of racial intelligence (Blanton, 2000). Clyde Chitty (2007) argues that the link between fixed intelligence and class are reflected in the differentiation of academic and vocational education: "we need to *educate* the middle class but merely to *train* the working class" (1). Alternatively, although credible accusations of racism and classism remain, tests of intellectual capacity opened up educational opportunities for lower-income children beginning in the 1950s (Blanton, 2000).

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1 Terman's results reflect that we tested for level of education more than capability, and his own racial assumptions. The latter were also clearly demonstrated in his hope to reduce the number of children born to non-white Americans.

5 Conclusion

The story of the intelligence test is not a celebratory one, but it was certainly an attempt to better serve the marginalized (in this case "serve" must be interpreted with the lens of the time), and build a more resilient society through scientific-social partnerships. It was the big ideas of scientific progressivism, and especially intelligence that created the opportunity, the possibility of a test for ability (and inheritance for sterilization based on the tests). Poets created and described this opening to the adjacent possible, designers created tests that could bring the current reality into line with that future, and debaters made the necessary connections (political, medical and institutional/educational) to bring the intelligence test from its niche in labs and small-scale schools to become a key element of the meritocracy in pre-war America. The history of social innovation offers us a glimpse of process, of agency and perspective, indeed the entire lifecycle of the innovation process.

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