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Abstract

Drawing on anthropological theories of play, deep play and games, as well as sociological interaction theories of risk, this paper develops a theory of consequential games. This paper suggests that in the United States much expert or entrepreneurial activity can be seen as a competition over creating the rules of games that others must play. In turn, whatever peril lies in these consequential games is the province of the saps that have to play, and whatever reward or prize comes from the game is captured by the expert or entrepreneur. The perspective that this paper advances, in turn, renders domains of life often seen as discrete (say private equity investing and biotechnological tinkering) comparable and in fact similar types of phenomena, all caught up in the crazy apocalyptic vitality that is contemporary capitalism.

Keywords: finance; DIY-biotech; games; experts; entrepreneurs; capitalism.

> [We] are born for games. Nothing else. Every child knows that play is nobler than work. He knows too that the worth or merit of a game is not inherent in the game itself but rather in the value of that which is at hazard. (Judge Holden in McCarthy, 2010, p. 249)

> If the technology is disruptive, on the other hand, the odds are that at the end of the transition, the leaders will have been toppled and new companies will be on top. (Clayton Christensen in Fisher, 2001)

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Games and their producers

We prefer to read Holden by way of Marx: people interact as participants in games not necessarily of their own choosing, with stakes not necessarily of their own calculation. Yet, the outcomes of these games adhere to them and come to define and perhaps destroy them (cf. Weiss, 2015). While we lack Holden's belief, expressed further on in the text, that war is the ultimate game, we do agree that games with stakes are an inescapable part of the human experience in general and a notable feature of what has been alternatively called late industrialism (Fortun, 2012), financialization (Krippner, 2011) or neoliberalism (Dardot & Laval, 2013; Harvey, 2007). None of the observations above, ours or Holden's, are particularly interesting or controversial. But, consider Holden's comment on the inherent meaninglessness of the game itself. The relationship between game and outcome is, in a linguistic sense, arbitrary. We might profitably conceptualize a game as an artificial language with a strongly bounded set of formalized rules (a syntax) which, unlike natural languages, leaves no room for alternative courses of action. Hence, as Holden notes, meaning (the semantic aspect) adheres to the stakes of the game rather than to the rules of the game.[1] A striking corollary, the theme of *Blood Meridian*, is that no ground for moral judgement, or consideration of alternative courses of action, can be found within the course of play.[2] When a game is set, its course must be played out. And contra a line of thought beginning with Samuelson (1938), Holden holds that games are not played to maximize utility, nor by rational actors.

We offer Holden's musings on games as a point of entry for a longer conversation about capitalism – one that turns on the ideas of 'creative destruction' and 'disruptive innovation'. In another era, Schumpeter (2008 [1942]), writing as an Austrian refugee from Nazi rule, and reflecting on the near-universal opprobrium that met capitalism in his day, suggested that there was an inherent, amoral, socially destructive dynamic integral to capitalist progress and growth. He called this 'creative destruction', saying that it was 'The fundamental impulse that sets and keeps the capitalist engine in motion [and it] comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates' (2008 [1942], p. 83). Lest we, in some modernist fugue, accept this as a rosy picture of progress, Schumpeter goes on and says that innovation born of creative destruction 'strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives' (2008 [1942], p. 84). Going one step further, Schumpeter then reflects on what this sort of social disruption means for the larger capitalist order. He ultimately concludes that the bourgeois class who manage capitalist industry carry with them a mindset and political agenda that, 'after having destroyed the moral authority of so many other institutions, in the end turns against its own' (2008 [1942], p. 143). Ultimately the managers of capitalism are self-destructive, and perhaps even destructive of the larger societal order of things which allows

capitalist processes of accumulation to function. While we may not necessarily embrace Schumpeter's apocalyptism, in this season of reactionary nationalistic populism and anti-intellectualism, -elitism and -democracy, it is certainly worth reflecting on Schumpeter's prophecy. For our purposes, though, it is enough to observe and appreciate Schumpeter's point that one of capitalism's essential processes is the often catastrophic but profitable game of destroying old ways of doing things in order to make way for new industries and new social arrangements.

Most unusual, too, for economic concepts that are old, live in prose and dance with Marx, creative destruction has a contemporary avatar, the business professor Clayton Christensen's 'disruptive innovation' (2006 [1997], p. xv). Christensen observes that well-managed, profitable companies are often supplanted by smaller companies offering technologies that are in many ways inferior to those of established companies. In Christensen's telling, established successful companies are victims of their own success – they stay in their lanes, listen to their customers and make predictable, incremental progress. They miss the larger disruptive elements present in capitalism and the manner in which technological change can shift market demands in ways that established companies typically do not anticipate. '… [T]he logical, competent decisions of management are also the reasons why they lose their positions of leadership' (Christensen, 2006 [1997], p. xvi). Ultimately, Christensen, recognizing the volatile dynamics inherent in making things in a capitalist context, sidesteps the social significance of it all and 'derives a set of rules, from carefully designed research and analysis of innovative success and failures … that managers can use to judge when the widely accepted principles of good management should be followed and when alternative principles are appropriate' (2006 [1997], p. xv). In Christensen's telling, the issue with creative destruction or disruptive innovation is simply anticipating what consumers (cf. Carrier & Miller, 1998) want, and running your firm accordingly. Christensen is not concerned with the ways in which disruptive innovation can rend the social fabric, create misery or even, following Schumpeter, lead to a situation in which capitalist accumulation is no longer possible. In disruptive innovation, we find Holden's calculus of the game turned upside down. Gone is the possibility that the game swallows its players, its place taken by a game lionized as always and appropriately maximizing utility to an ultimately positive, though perhaps distant, social end.

Like so much solutions-oriented management-speak, disruptive innovation is an emaciated husk of Schumpeter's 'creative destruction' (cf. Lepore, 2014). Disruptive innovation is also the way in which a number of our informants understand the changes they were creating in society at large – utility-maximizing games played within capitalism without any worrisome larger consequences for social life. If we offer anything of novelty in our analysis, it is the insistence that we bring Schumpeter's apocalyptic sense of creative destruction and the social violence inherent in disruption back to the fore, since this aspect falls out of its contemporary technocratic incantation.

So just what is to be gained by conceptualizing *homo economicus* as a producer and player of these destructive, disruptive games with stakes? First, we propose to gain continuity with the anthropological literature on deep play (Binkley, 2003; da Col, 2012; Feige & Ben-Ari, 1991; Geertz, 1973; Moss, 2012; Sallaz, 2008; Schimmel, 2006; Varenne & Cotter, 2006). Second, we propose to account for what Thrift (2005, p. 1), writing of capitalism's ongoing durability, wrote: '[Capitalism] is also fun. People get stuff from it – and not just commodities. Capitalism has a kind of crazy vitality. It gets involved of all kinds of crazy symbioses'. Thrift points to an aspect of capitalism often ignored, or treated as simply and uninterestingly destructive, in the academic literature. Yet in the unexpected juxtaposition of utilitarian and anti-utilitarian, the highbrow and lowbrow, there is a vitality which demands an accounting.

And here we note an affinity between Thrift's observation of the 'crazy vitality' of capitalism with what Geertz (1973, p. 432 ff.) observed in Bentham's footnote on the irrationality of deep play. The stakes of deep play are beyond rational calculation and tend to either the tragic, as exemplified by Holden's argument for war as the ultimate game, or to the comedic and hare-brained – as in Mel Brooks's comedy, *The producers*, about trying to profit from a deliberate theatrical flop.[3] Both war and con artistry may be irrational, and the risks may outweigh the rewards, yet both, as Geertz argued for the cockfight, confer meaning upon their participants.

In this paper we take up the actions of entrepreneurs, those producers of novel economic games and extravagant symbioses, in venues scientific and financial (e.g. Burrough & Helyar, 1990; Ho, 2009; Souleles, 2015; Tett, 2009), minding that neither science nor finance is as well bounded as they may appear from a distance and both involve a bit of what may charitably be called showbiz (Boon, 2000). Our aim is a particular type of entrepreneur and a particular type of enterprise – those advancing what Bower and Christensen (1995; Christensen, 2006 [1997]) termed 'disruptive innovations'[4]: in short, new 'disruptive' technological games designed to, following the etymology provided by the OED, alter or destroy the structure of an existing arrangement.

In doing so we draw on our four combined years of fieldwork in Silicon Valley on Biotechnology and in New York City on Private Equity. Hence, we take in the geographic poles of the contemporary American economy. Private equity investors buy and sell companies for the profit of syndicates of limited partner investors (everyone – from insurance companies, to university endowments, to large pension funds, to sovereign wealth funds – invests in private equity). Private equity investors tend to have past experience as investment bankers, management consultants or, a bit less frequently, as lawyers, accountants or engineers. Nearly all of them have college degrees, and about half of senior management have MBAs. They tend to be very good at financial modelling and accounting, be individually wealthy and live in global financial hubs such as London, New York and Chicago, whereas their investment companies can be just about anywhere (cf. Ho, 2015, on 'supermanagers'). Private equity investors, when they invest in a company, take a controlling stake of the

company and often radically rearrange business operations and debt structures, so that, 3–10 years later, investors can sell the company at a profit and give capital with a healthy return to investors. Do-It-Yourself biology (DIYbio) is a phenomenon (Meyer, 2013) that has seen the biological laboratory moved from its academic and industrial moorings into spaces like kitchens, garages and industrial parks. Though DIYbio has differing permutations and focuses, ranging from disinterested scientific inquiry to artistic interventions, in Silicon Valley, where Scroggins conducted his fieldwork, the locus of activity was engineering organisms with potential commercial applications. Hence, the biologists in question are DIYbiologists working in the Silicon Valley 'garage lab'. Unlike working scientists with PhDs, the DIYbiologists at Scroggins's field site tended to have past experience as engineers and executives in large technology companies or startup companies founded during previous Silicon Valley booms. They tended to be technically oriented and possess college degrees in engineering or business. These DIYbiologists also had ample free time to devote to their interests, and almost all had a desire to 'get some skin in the biotech game'. The excitement and feeling of catching an emerging industry at the ground floor were the main drivers of participation among the 'garage lab' members described here. Their experiments, such as they were, were not oriented towards scientific discoveries, but rather towards proof-of-concept experiments that could be pitched to potential investors. Much like the private equity investors Souleles worked with, the DIYbiologists Scroggins worked with enjoyed the game of disruptive innovation, aspiring to disrupt industries as diverse as household lighting and pharmaceuticals. And why not? For any entrepreneur, disruptive innovation is the ultimate game.

As our ethnographic vignettes will show, a premium was placed on the disruption of industries in both locations. And, as we have already suggested, disruption is a deeply played game where the consequences often outweigh possible rewards. As we will demonstrate, however, the risks and rewards are not distributed equitably.

What do we mean by entrepreneur?[5] We employ entrepreneur here in spirit of its original appearance in English: as the manager or promoter of theatrical productions. In contemporary usage, both academic and popular, the term producer is closest in spirit to the older meaning of entrepreneur. A producer, of a movie or play, is the person who bridges the financial and creative sides of a production by marshalling and co-ordinating the various front and back house players who have a role to play in a production. A producer is usually relatively unknown to the public and is not the face of a movie or play. Whereas in contemporary usage the entrepreneur is often a romantic figure and the face of a beloved company (think of Steve Jobs at Apple), a producer is decidedly behind the scenes and plays a subtler, yet no less important role. Tellingly, producers find themselves between and betwixt two spheres of action – astride the front and back stage in the theatre, but just as commonly, astride two disciplines.[6]

By game we simply intend those productions organized by entrepreneurs. It is necessary to have investors, actors, stagehands and an audience.[7] A mechanism of game play is also required – for the entrepreneurs, a business or scientific model rather than a script.[8] But in all cases, hype and showbiz accompany the entrepreneur. Returning to Boon (2000, p. 431, cf. fn p. 13), in coupling 'show' to 'business' he reminds us of elective affinities between productions, business and the gambles with both finances and status that all are built upon – affinities which come together, along with entrepreneur, in the words enterprise and enterprising.

An example: early in Scroggins's fieldwork in a DIYbio laboratory a problem with materials arose. During the course of a laboratory meeting a situation developed in which we required a particular set of biological components to complete a project, yet we had neither the means to fabricate them ourselves nor the proper credentials (this being a Do-It-Yourself biological laboratory as opposed to an academic or industrial laboratory) to order them from a supplier. There was one option left open to us, however. One of us could, with the help of a friendly accomplice in a nearby academic laboratory, pirate the needed biological materials and transport them to the DIYbio laboratory. Normally, obtaining biological materials like this would require a Material Transfer Agreement and some legwork, but our contact in the academic laboratory was willing to clone the part repository for us, after hours, at their lab. Following the cloning, one of our group would rendezvous with our contact and drive the parts to the DIYbio laboratory.

At this juncture, one laboratory member, Kenneth, told the story of Napster and iTunes. This was a story well known to Kenneth, who made a successful exit from a startup company he founded in the same period and was attracted to DIYbio by the possibility of creating a new industry. 'Without the invention of Napster', he says,

> there would have been no impetus to develop iTunes. Music executives needed the entrepreneurs behind Napster to instruct them about digital music and iTunes was their educated reaction. The music industry needed Napster to demonstrate that the rules of the music industry had changed.

He notes the same phenomenon was at work in the early days of YouTube when most of its content was illegal. That illegality teaches a lesson is the way of the disruptive economy. In this telling, we would be doing industry and regulators a favour by pirating the biological parts we need and using them to build our project, a home lamp powered by bioluminescent bacteria. The landscape of biological inquiry was changing, and the old rules for transferring biological materials were not keeping abreast of the changes. In fact, our piracy would be the necessary impetus for regulatory agencies and large corporate actors to step in and issue rules that everyone can abide by.

In establishing a new rule, judged valid by our own authority (our self-claimed expertise) and position, we would be positing a speculative new

arrangement (a game) for transferring biological material, and instructing those who would regulate or enter the new arrangement – that is changing the rules of play – in what was now possible. The game was already rigged; we would simply make the rigging publicly viewable. Taking this step, Kenneth argued, was part of the fun and excitement of constructing an industry in a grey area of the law.

In what follows we discuss social-technical games authored by entrepreneurs – in particular, games of making and managing the configurations of people and machines out of which the contemporary world is made – and suggest the ways in which these games are disruptive of larger social life. To author a game is to possess the ability to co-ordinate the actions of people and machines across time and space, that is, to hold the social ground which makes one irreplaceable by other people or machines. The ultimate stake here is harnessing technology to the management of knowledge systems. And we do not intend management to denote efficiency in the manner of technocracy (Akin, 1977); rather we intend management to denote the authorship and maintenance of technological games (productions!) that others are forced to play a role in. The stakes at play in this game – the technological version of silencing – are rendering people and machines obsolete.

We find it as well in the way the language of games and gambling pervades life in America. People make bets, take positions and keep score. One competes, often immersively (as in Zaloom's Chicago-based futures traders, 2006; cf. Heslop, 2016). This much is common knowledge to anyone who has had even a fleeting encounter with business and risk in American life (e.g. Fraser, 2004). There is also a cottage industry of publishers and journalists examining the outsized societal consequences of elites taking these risks for workers (e.g. Burrough & Helyar, 1990) or for the economy as a whole (e.g. Tett, 2009). Goffman (1967, p. 262) notes that in addition to seeking action, risk, fateful moments and consequential actions to test themselves and give meaning to life, people often enjoy risk vicariously, whether as sponsors or spectators.

Further, the international pattern we describe in two arenas of American life, finance and science, constitutes a more general pattern found wherever American institutions are exported.[9] Recalling Holden's quote that began this paper, perhaps the most complex, consequential and ramifying area we find in this kind of game is the conduct of the drone war in Afghanistan. From the comfort of government and corporate offices around the globe, the entrepreneurs who bridge legal, military, technical and political arenas debate and author the rules of engagement which govern the conduct of the drone war through mundane technical arguments over the relative weight given to one or another algorithm, or the relative trust value placed on a particular piece of intelligence.[10] As Williams (2010) describes in a history of the CIA's Afghanistan drone war, those caught within the rules of engagement in the Pashtun tribal areas must, knowingly or not, play a game not of their choosing, under circumstances beyond their control, the ultimate stake of which is their destruction.

In what follows, we will describe, within two specific professional domains in the United States, private equity investing and synthetic biology, how entrepreneurs are able to (potentially) reconfigure familiar locales and relationships into new, unfamiliar and high-stakes configurations. We trace two examples, through matched ethnographic vignettes of entrepreneurs rendering, or attempting to render, one another silent and obsolete. First, we trace the transformation of financial reporting from a low-intensity to high-intensity endeavour, a move in which increasing quantity comes to require new qualities. Second, we follow a path from synthetic chemistry to synthetic biology and on towards the outline of a digital biology. Finally, we close by suggesting that being caught in games authored by experts is a ubiquitous feature, not necessarily a bug, of contemporary life in America.[11] And further, these games extend beyond the geographical borders of the United States as the intellectual exports of financial, development, educational and military experts.

In the two vignettes below we explore games in which the consequences are to be rendered obsolete: in the first case, through the replacement of one generation of managers by another and, in the second, by the displacement of an older academic discipline by a prospective newcomer.

Investing and babysitting

Early in Souleles's fieldwork on why and how private equity investors make investment and management decisions, he came across an odd age and power dynamic in the way in which private equity firms relate to their portfolio or investment companies. Whereas in much of American business, age and power positions go hand in hand,[12] the private equity situation subverts this. Often private equity firms buy a controlling stake in the companies in which they invest and have a clear idea of how a given company ought to rearrange itself productively and financially. To this end, private equity investors will often closely manage particular executives (say the Chief Financial Officer [CFO]) in their portfolio company to ensure their plan is enacted. These tendencies in private equity were consistently apparent across Souleles's 83 informants, 103 interviews, 16 field-trips to industry conferences and networking events, as well as the idiosyncratic hanging-out Souleles did in informants' offices, apartments and business schools.

One of Souleles's informants, Cat, a former vice president in a large bank's private equity fund, described the relationship: 'It's more you're just paying attention to what they're doing – a little bit of babysitting'. This particular informant, at that time, was in his late 20s and had graduated from a liberal arts college with no particular specialization in finance. The 'babies' he was minding were often middle-aged executives who had spent their lives in a particular industry.

One thing financiers do when they take control of a company is implement accounting standards that are often unfamiliar to the company, and, in turn,

financiers expect reports based on those new standards more often than before – perhaps monthly or weekly as opposed to quarterly or annually. All businesses have a method of accounting, so the concept of accounting itself is familiar. Private equity, however, make the familiar strange by changing the rules of the accounting game for their captive executives. For the private equity investors, this is seen as regimenting accountability by way of more complicated and involved reporting and tracking. This is both a bureaucratic imposition and claimed as a technological improvement in the management of a firm.

Another informant, Phil (currently a vice president) elaborated:

> Phil: The big wakeup call is [financial] reporting. Companies might be producing very basic monthly reports and we say, OK, we're going to need weekly reports with about twenty times more detail than you've ever produced before. That sucks. The worst job in, and I think one of the worst jobs in the private equity ecosystem, is being a CFO of a portfolio company. It's terrible. The turnover there is really high and you, I frankly don't think get paid enough for what they do. The CEO is on the hook for executing the strategy, but the CFO is really the guy who is in charge of interfacing, probably most frequently, with the mid- and junior-level people at the private equity group. And it sucks. So, the CEO might get like 3, 4, 5 per cent of the options, 3, 4, 5 per cent of the stock in the company as equity incentive. The CFO is going to get like 1, 1/2. Kind of sucks.
>
> Souleles: The CFO's on the phone all day with 25-year-olds at the private equity firm?
>
> P: [laughs] Yeah, exactly. One portfolio company, I was talking to the CFO at least once per day for three years.
>
> S: He's your buddy now, right?
>
> P: Yeah. Well, he quit.
>
> S: [laughs]
>
> P: We had actually a very good relationship. I think I was his safe harbour at times, cause he'd call and just bitch about other things, that is how it goes sometimes.

Not only are younger, early and mid-career financiers babysitting middle-aged and older executives, they are deciding what risks and strategy a company will take *vis-à-vis* their newly held middle-aged executives. In turn, executives quit or are fired when they cannot do what private equity firms have decided is important. The personal risk, uncertainty and consequences of the private equity investment are placed squarely on company executives on the one hand, and, on the other hand, on investors who lend private equity firms their money. After all, it is the private equity investors who have brought procedures and processing and superior technical ability to bear on a

given company. It cannot be their fault that middle-aged executives do not live up to the new rules. The important point is that the rules of a well-understood and famously boring game, accounting, are suddenly made strange and hostile by the introduction of a new set of rules and experts.

Ritual battle in the plenary

A few months into Scroggins's fieldwork at a 'garage lab' for biology in Silicon Valley, he followed a number of his lab-mates to a synthetic biology forum at the University of California, San Francisco (UCSF), where a pair of young and famous academic synthetic biologists, Drew Endy and Jay Keasling, was the big draw. Endy and Keasling were speaking on a public panel about the future(s) of synthetic biology. Scroggins's participants expected the experts to address the role that DIYbio and networks of independent citizen-scientists could play in advancing synthetic biology, as well as areas of synthetic biology with immediate commercial possibilities. Many of the members at the 'garage lab' where Scroggins conducted fieldwork in Silicon Valley were entrepreneurs and engineers who had created successful careers in the midst of previous technological revolutions and were hoping to regain the excitement of those days. One 'garage lab' member explained to Scroggins prior to the conference that working in a 'garage lab' was a way to figure out how best to put some 'skin in the game' of synthetic biology.

It was, for most of the day, a typical academic conference in that the discussions narrowly focused on technical matters: study outcomes and future directions for research. The plenary session with Endy and Keasling, however, deviated from the typical script. At one point, Endy prophesized that when synthetic biology becomes a fully rationalized engineering discipline, after 20–30 years, his colleague Keasling would be able to retire to his native Midwest and raise crops of styrofoam cups rather than corn. This miraculous future would only happen, Endy argued, if synthetic biology could be transformed from a naturalist discipline concerned with understanding processes into a fully rationalized engineering discipline aimed at controlling natural processes.

After gaining the audience's attention with his claim, Endy went on. The key to transforming synthetic biology into an engineering programme lies in metrology – the science of measurement. Having come to synthetic biology from civil engineering, he understood how well-characterized, standard measurements could cohere a field and permit colossal undertakings like co-ordinating transcontinental rail traffic or enabling global trade. And the step that will enable synthetic biology to take this leap from understanding to control is the development of reliable and standard measures of cellular activity, which are absent today. In Endy's framing, in Endy's game, synthetic biology will only happen if a standardized metrology emerges. And, of course, Endy is uniquely qualified to create, to develop and impose the measures. Endy is saying that if synthetic biology is to emerge, it will only do so if it plays by Endy's rules.

Endy's remarks prompted a number of questions from the audience. One older professor rose from the floor and asked, in less a question than an accusation, how synthetic biology differed from synthetic chemistry. This was a rhetorical question. Another followed: What exactly could be accomplished by synthetic biology at the cellular level that was not already possible, at industrial scales and efficiencies, by synthetic chemistry at the molecular level?

Endy's interrogator argued that synthetic biology was just an attempt to invent a flashy, yet unnecessary, discipline. The transformation of matter through chemical processes had already been established and refined by synthetic chemistry, the interrogator argued. Over the last 150 years, synthetic chemists have refined the transformation of matter into an imposingly efficient art. Transforming corn into plastic is a mundane activity; growing styrofoam, a foolish fantasy. Synthetic biology, the questioner continued, could only add a few specific and limited efficiencies over the success of synthetic chemistry. And with that, the questioner took his seat. His objections went unheeded by the plenary panel, and his line of questioning was not picked up by the audience. It fell silent.

Daring young people with their new-fangled machines

In both cases, challenges from the younger party were over the conduct of the game – how financial accounting should be reported or whether the transformation of matter should proceed at the molecular or cellular level. However, in both instances young professionals, through mastering technology and cultivating the ability and places to leverage others in accepting their application of this technology, are able to displace, or potentially displace, older and more established players.

The form of the games is the same, yet the rules are changed. An unfamiliar mode of accounting, or an unfamiliar mode of transformation, is introduced. Yet, the stakes here, seen clearly in Souleles's portrait of 'babysitting', are to be rendered obsolete and superfluous. That is, to be silenced and removed from the game.

Scroggins's vignette speaks directly to a characteristic that will be brought out in the next set of vignettes, namely that entrepreneurs' speculations begin with discursive games. Below we present two cases of playing with possible futures: the creation of an airport through the magic of a business plan and the creation of a glowing plant design to replace the humble lamp. In both cases the mastery of a technology – financial modelling and synthetic biology, respectively – create the leverage necessary to marshal people and machines to order.

Mile high social status and private equity deals

Just as Silicon Valley and DIYbio laboratories bring novel technological forms into existence, private equity financiers rearrange money, people and the

physical world in forming new businesses. Occasionally, they do so for entire nations, as in the present case of the airport. These are the deals that private equity firms do – total social facts (Mauss, 1990) that rearrange other people's worlds. Simply put, private equity investors use borrowed money to buy companies and sell them at a profit. Most of their returns go to their investors (e.g. pension funds, insurance companies, sovereign wealth funds or university endowments), but they get to keep 20 per cent of whatever profit they make on top of a percentage management fee. So, for a simplified example: Columbia University lends a hypothetical private equity firm, Michael Scroggins Equity Partners, $1 billion to go and buy other companies. Michael Scroggins Equity Partners over the next 10 years uses the $1 billion to buy a dozen or so companies (everything from fast food franchises to software companies to private security firms). Michael Scroggins and Co. change around their management, hire and fire many people, open new branches and close down old factories and ultimately make $2 billion selling those dozen companies. Michael Scroggins Equity Partners would keep $200 million in addition to the $10 million they had received every year to manage money. This work is incredibly lucrative. And due to the nature of business limited liability, if Michael Scroggins and Co. fail to make money, their fund simply goes away. Columbia University is not able directly to recoup their losses from the people in Michael Scroggins Equity Partners. In this way, private equity investors are shielded from the monetary consequences of their actions. As interactional experts, or financial bureaucrats, they set and enforce the rules by which others play.

Hopefully this background gives some sense of what it means to say a private equity fund is controlling an airport. The fund uses other people's money to buy a government concession to take an existing airport and then run it privately, seeking a profit. Souleles heard about this when talking to Karl, a partner in a large Greenwich-based private equity fund. Souleles had asked Karl what deals excited him, and Karl started talking about an airport.

Karl said that the creation of the airport was great for the poor country in which they were working. Karl noted that 'they were creating standing white collar jobs [when] people otherwise' would have left the country. He also noted that they inherited an airport that had been wildly overbuilt under 'a lot of government cronyism'. Karl's firm partnered with a company that had privatized other companies, and they borrowed the airport's new CEO from another one of Karl's fund's portfolio companies. They started the 5–7-year process of steady capital improvements. They brought in a human resources director who had had a good long career successfully 'battling labor unions'. And they spent two years 'building the most complicated financial model in the world' in order to imagine the next 40 years of the airport.[13] And this was all done from a standard business conference room in suburban Greenwich.

Karl was happy with all of this. He felt that, via their management decisions, they were making a better airport, one that had a chance of working well and turning a profit over the next 40 years. Souleles often came across these utopic justifications for the process of private equity investing, and his investors

called the money they invested 'change capital'. Yet we should keep two things in mind. First, Karl's firm was planning 40 years of an airport's future, never having lived in the country where this airport existed, never having worked under the managers they were putting in place and, perhaps more importantly, never having run an airport. Also, due to the structure of most limited partner agreements, Karl's firm would likely sell its stake within 10 years of investing. So, at most they should only be investors for 10 years of their projected 40-year plan. And second, private equity firms like Karl's are not ultimately liable for any mistakes they make. Should the 40-year plan they put in place fail, or the managers they put in place prove inept, they are personally shielded from any legal liability. Though it may be harder for Karl and co. to raise their next fund, ultimately the municipality will be out an airport and their investors will be out money.

Should this airport fail, this will simply be one small failure in Karl's largely unblemished investing career. Of course, an entire nation may also be without air travel.

The hype cycle and glowing plant

During the course of Scroggins's fieldwork, a community project in the 'garage lab' spun out of the garage in the form of a startup company. This was the Glowing Plant project. The Glowing Plant project consisted of a Stanford-trained plant biologist, the CEO of a software startup and a former Bain & Company consultant – the interactional expert connecting biology to the world of business. These three established a startup company aimed at developing a houseplant that lights up at night like a lamp through the use of bioluminescent bacteria. The project was inspired by a Philips design probe and the movie *Avatar* (think of the glowing foliage). Glowing Plant raised $500,000 for the project via a Kickstarter campaign, which promised a future in which trees can become streetlights and lawns can be made to glow. In his TEDx talk, Antony Evans, the former Bain consultant, claimed that 'the glowing forests in *Avatar* aren't just science fiction', before going on to list the scientific uses of bioluminescence. Never mind that glowing forests and bioluminescence biomarkers are phenomena at quite different scales.

An informant gave some industry context, explaining to Scroggins how Silicon Valley works. As John explained, the hype cycle is a well-known phenomenon in Silicon Valley and is used reflexively to gain a market advantage over potential adversaries by attracting angel funding. Investors, in John's words, were often attracted to the hype just as moths are attracted to a flame (or, maybe, a glowing plant in this case). To drum up hype, companies plan and orchestrate media events to give an impression that something important is happening. As it is thought that the advantage in pioneering a new market goes to the first mover, giving the impression of a finished product yields a tremendous advantage in courting investors, even if the product is purely

speculative. The startup whose hype burns the hottest for the longest usually prevails in the end. Failure is expected, as is pivoting from one business model to another until one stumbles upon profitability. These theatrics are all in service to raising the funds and attracting the capital, engineering talent and marketing savvy that can turn a speculative idea into a concrete product. John continued that building hype is especially important if the road to market requires jumping a significant number of technical hurdles. And at hype-building the Glowing Plant team excelled, even going so far as to hire a PR firm to promote their Kickstarter campaign.

In technical terms, Glowing Plant intends to take a luciferin system from the marine bacteria *Vibrio fischeri*, found in squid, and place it into an *Arabidopsis* plant, thus causing the plant to luminesce, or glow, in darkness. To affect this transformation, they plan to use the software to design DNA sequences, then have these sequences laser-printed. Once printed, the DNA will be transformed into the *Arabidopsis* plant via agrobacterium. This portion of the project is regulated by material transfer agreements (MTA) governing the movement of recombinant DNA between laboratories. Due to the use of agrobacterium, it is against United States Department of Agriculture (USDA) regulations for plants transformed in this manner to leave the Glowing Plant laboratory. However, once the plants transformed with agrobacterium are deemed to glow bright enough in darkness, a final transformation will be done with a gene gun. It is the use of the gene gun that allows Glowing Plant to ship a genetically modified organism (GMO) to consumers without regulatory oversight within the United States.

Keep in mind, while much of the critical commentary, both pro and con, has assumed this plant can be created (it is a greater technical challenge than making, say, blue grass), the plant remains hypothetical. Apart from the still-hypothetical existence of the plant, there is speculation, due to the energetic requirements of light production, over whether the transformation can produce a light visible to the naked eye. Like Karl's prospective airport, Glowing Plant is a speculative design and a prospective production.

In the world of DIYbio, the use of digital technology to model physical experiments in Silicon Valley bridges the gulf between the knowledge of the expert and amateur experimenter. Glowing Plant, in the current style of Silicon Valley, took the form of a lean startup. The Glowing Plant project used digital technology to augment a single trained scientist, to multiply his efficiency and to enable him to do the work of a fully staffed laboratory. It was a force multiplier, or, at least, that was the idea. While this is a timed and tested strategy in computer science, it is new to biology. If DNA can be handled according to the norms of software development and experiments conducted via computer simulation rather than at the cellular level, then Endy's call for a standardized metrology based on cellular activity can be avoided altogether. In a move that echoes the synthetic chemist's criticism of synthetic biology as a foundationless discipline, Drew Endy has been critical of the Glowing Plant project, asking rhetorically during an interview with *Nature* (Callaway, 2013): 'Never mind the genetic

engineering involved – just what does the physics say about the feasibility of the project working out?' Note that this appeal ignores the molecular claims of synthetic chemistry, as described in the previous vignette, in favour of the photons of physics. This may be subtle, but even when facing a potential future challenger, Endy denies comfort to an older foe.

And so we return to the Glowing Plant, only to find it defunct. However, Glowing Plant has succeeded in passing through the hype cycle and attracting long-term capital and support from Y-Combinator, a well-known incubator in Silicon Valley. This move bought Glowing Plant engineering expertise and, most importantly, time to develop the glowing mechanism. Unfortunately, not enough of either to successfully pivot. And while the entrepreneurs behind Glowing Plant are busily employed, producing new games for new companies, those who backed Glowing Plant's kickstarter were not so lucky. They were left with neither glowing plants nor cash refunds.

Just as Endy's comments in the first vignette, two years prior to his Glowing Plant question, represented an attempt to change the rules of synthetic chemistry by moving the location of measurement from the chemical molecule to the biological cell, so too does the digital challenge posed by Glowing Plant threaten to move the location of measurement from the biological cell to the silicon chip.

Both Karl and his private equity firm and Glowing Plant and its startup hypemen are rewriting the rules by which others will have to lead their lives. The United States Food and Drug Administration (FDA) and synthetic biology may need to reckon with a new paradigm for genetic innovation, and air travellers in a small nation will have to fly through Karl's spreadsheet.

Concluding consequences

> Games of chance require a wager to have meaning at all. Games of sport involve the skill and strength of the opponents and the humiliation of defeat and the pride of victory are in themselves sufficient stake because they inhere in the worth of the principals and define them. But trial of chance or trial of worth all games aspire to the condition of war for here that which is wagered swallows up game, player, all. (Judge Holden in McCarthy, 2010, p. 249)

In the vignettes above we have demonstrated situations of games – the fabrication of a glowing plant and the deal process leading to the privatization of an airport. We have also suggested that, in these instances of private equity and venture capital, experts, middlemen or investors are able to produce games that put others' status on the line. They do not simply solve the innovator's dilemma in a way that is self-contained to their firm, or their market. For the airport, Karl's firm put a management team of their choosing in place, a management team that would ultimately bear responsibility for the 40-year model which Karl and his team built, far from any airport. And for the glowing

plant, tinkerers were setting into motion a creative process that would ultimately be consequential to scientists and government agencies that had nothing to do with actual plant fabrication. We have shown examples of how the familiar is turned strange and unforgiving as in the case of babysitting and accounting; or how an expert in DIYbio can potentially force others to use his notion of measurement and metrology; or how private equity investors can set the conditions under which air travel is possible in a country; or how incipient expertise begins to take form in the guise of glowing plants. Our cross-section is meant to show a few different forms that entrepreneurship takes, as well as to suggest how commonplace the logic of this mode of interaction is in American life. As Holden notes, the winning and losing of such economic games comes to inhere in individuals and to define them. Scientists are known by the acceptance, not rejection, of their ideas. Venture capitalists are known by the success, not failure, of their deals. And when a scientific paradigm or an industry is rendered obsolete, lives and careers are ruined, or, perhaps, though they are 'creatively' destroyed, they are destroyed nonetheless.

In our conception of the entrepreneur, we have intentionally downplayed the economic role to emphasize the aspects of entrepreneurship shared with theatrical productions. We feel justified in taking this stance as the entrepreneur is commonly framed in exclusively economic terms. No further development in an economic direction is warranted here. What is warranted is the pulling together of the role of the entrepreneur as producer with the theatrical element of play, deep or fateful. Consider the situation Geertz (1973) describes in the Balinese cockpit. A village cockfight is a dramatic production. Its producers are the middlemen who arrange the bets. Its investors, the bettors; its actors, the cocks. In Geertz's (1973) notion of 'deep play' play the idiom is theatrical, the action financial and the stakes death: symbolic for the losing bettor and his associates, material for the losing cock. A cockpit or a craps pit (Goffman, 1967) are singular precisely to the extent they are not mundane (cf. Sallaz, 2008).

Note also that the risks of the bet are not fully divided; the man who bets faces ruin as surely as those caught in his network. In a footnote, Geertz traces the interaction between markets and cockfights in Bali. The cockfights are tightly integrated into the market system by supplying large sums of money to circulate. Hence, the risks and rewards travel further than a passing glance reveals. A cock's death or victory reverberates far and wide.

In another setting, at the peaks and summits of the Himalayas, Ortner (1999) describes another high-stakes game: mountaineering. This is a game played by wealthy foreigners in which they seek to scale the earth's highest mountains. The possibility and the relative likelihood of death in any Everest expedition is part of what makes mountaineering appealing and meaningful to wealthy foreigners and a viable, lucrative career path for Sherpas. And this game becomes meaningful because people have the real possibility of dying. Therein lies the dramatic appeal of the production.

In an ethnographic context, perhaps closer to our own, Riles (2011) describes the way in which collateral requirements and contract law, the games that international financiers play, come to be the rules by which finance is governed in the absence or roll-back of state-level regulation. In the absence of governmental coercion, financial experts conjure markets that mirror their own professional practices.

While it is easy to romanticize away Bali or Everest, or perhaps shun international financiers as doing boring, bureaucratic work and thereby to pass over the full implications of the cockpit or mountaineering or collateral, Goffman (1967) brings our attention to role of action and risk in contemporary capitalism through the image of the craps table as a place 'where the action is'. The craps table, along with many other casino scenes, is a place where people find that 'the chances they will be obliged to take chances' are increased (cf. Sallaz, 2008). While in terms of our earlier claims, places where one is 'obliged to take chances' would include Judge Holden's frontier where his war reigned unabated and the Balinese cockpit. Koyama and Varenne (2012) gesture towards the ubiquity of being 'obliged to take chances' in contemporary America by reading educational policy formation (in the case of No Child Left Behind) as a deep play with the future(s) of parents and their children caught in a ramifying web of disagreements between well-intentioned educational entrepreneurs as they attempt to fuse educational research to public policy. Varenne and Koyama cogently argue that the action is in the schoolhouse where the failure of some children in high-stakes testing bequeaths meaning upon the success of others.

While these examples were plucked from the academic literature, we can join these images with a few popular examples of theatrical entrepreneurs who deeply play with the futures of others. Take Walt Disney and Steve Jobs – a play on the image of America and the future of the music and telecommunications industry, respectively. In each of these places, entrepreneurs ply their discursive trades: tying people and materials together in new configurations and swallowing up the old, rendering them obsolete.

Boon (2000, p. 427) observed similar phenomena at work in P.T. Barnum's productions. Entertainment (as in shows, deep plays and games of chance and commerce) is an unstable term. It forever balances between offering an old and therefore boring, but perhaps comforting experience, and the new and therefore novel experience. Boon notes that entertainment (and, in turn, we note, war) teeters and totters between the old and the new on the strength of technology. Each new technology ushers in novel mediations of and hence disruptions to, even the oldest phenomena.

Gesturing towards the theatre as we have also suggests an affinity between our observations and those that run deep in social theory – that part of what makes people human is the ability to enter absorptively into new worlds, new games and new frames (Graeber, 2013; Huizinga, 1950). And while this human ability is celebrated as play, or as the ability actively to create a world around oneself, when the individual is not involved in creating the games

which they are obliged to play, something more coercive takes hold. This is what happens when others author the games we play.

In closing, consider how Wessel and Christensen (2012) describe the stakes of games played with disruptive innovations: 'For 20 years we've described missile after missile that took aim and annihilated its target: Napster, Amazon and the Apple Store devastated Tower Records and Musicland'. Perhaps downplayed in all of this are the stakes: industries ended, cultural touchstones rendered nostalgic, careers destroyed, society disrupted. The crazy symbioses and vitality of capitalism noted by Thrift (2005, p. 1) find their highest expression in the high-stakes games produced by entrepreneurs intent on disruption (Christensen, 1993). The actions of the entrepreneurs and the ruins of their strikes are well-worn scholarly topics. What is missing from our understanding of contemporary capitalism is consideration of the other stuff people get from capitalism, that the games are fun, and, ultimately the larger consequences of euphemisms like disruptive innovation.

> His feet are light and nimble. He never sleeps. He says that he will never die. He dances in light and in shadow and he is a great favorite. He never sleeps, the judge. He is dancing, dancing. He says that he will never die. (McCarthy, 2010, p. 349)

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Notes

1 In wrestling with the constituent elements of social action, Weber (1977) turns to card games as an elementary example of social phenomena by noting that, during game play, one must orient to and follow the rules of the game or risk destroying one's social standing.

2 Staal (1979, pp. 9–10) has remarked upon the similarity of ritual and game play. Both proceed through close adherence and attention to explicit rules, and both forego the utility of effective action. After developing this point, Staal concludes that 'ritual is one up on most games because you cannot even lose'.

3 Bentham's footnote, in his *Theory of legislation* (1914), occurs within the context of a discussion on the relationship between wealth, equality and happiness.

4 For our purposes a disruptive innovation is any innovation (material or semiotic) intended to overturn the normalized rules of existing industries. Or, as we prefer, a disruptive innovation is a new game which displaces an older game. Think of the eclipse of older card games by newer games – such as the eclipse of the old game All Fours by the new game Poker. The import is in a new set of rules, a new syntax, taking effect.

5 The idea of the entrepreneur as an economic actor derives from Cantillon (1959) who first ascribed a primarily economic action to the term entrepreneur in the form of one who assumes risk in hopes of profit.

6 Here we suggest that our entrepreneurs have something in common with Collins and Evans's (2007) interactional experts. However, in our opinion, Collins and Evans stop short in describing interactional expertise as a purely linguistic competency. Our entrepreneurs, in contrast, are both materially and verbally competent.

7 The producer of theatrical productions and our use of entrepreneur share what Wittgenstein termed a 'family resemblance'. They are not the same, yet the similarities are hard to deny.

8 And here we suggest, but find no space to develop, an affinity between scripts and models in organizing productions.

9 An obvious case would be economic development. Ferguson (1990) and Mitchell (2002) have powerfully critiqued the implications of how American aid agencies represent Lesotho and Egypt, respectively. We would modulate their concern to include the deliberations over the constitution of those representations.

10 For a brief analysis of the role socio-technical experts played in target selection during the Vietnam War, see McDermott (1969).

11 By American we intend an interactional pattern formed by individuals and institutions. We do not intend that this interactional pattern is geographically limited, but can be found anywhere American institutions exert influence.

12 Tech companies and startups are an arguable exception.

13 This is not as outlandish as it may appear. Often plans are made decades into the future for infrastructure investments and changes.

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