Towards a cultural science of videogames: evolutionary social learning

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ABSTRACT

This paper outlines a cultural science approach to videogames. Using the example of the independently developed *Minecraft*, we examine the dimensions of social learning involved in playing videogames that are characterised by relatively unscripted gaming environments. We argue that a cultural science approach offers an analytic framework grounded in evolutionary externalism, social learning and emergent institutions. We develop this framework by proposing a multiple games model of social learning.

1   Introduction

Videogames are a burgeoning domain of new media study (Banks, forthcoming) and economic analysis (Castronova 2005). A significant reason is due to the sheer size of the sector as economic output and the mass popularity of videogames as cultural consumption. But a second reason is due to the opportunities it affords to study adoption of new technologies and the effects of those technologies on human behaviour, in particular learning. This paper seeks to develop a cultural science approach to videogames that emphasises how videogames technologies, especially in relation to online games, are technologies of social interaction, social production and social learning.

A cultural science approach builds from the focus in media studies and games studies (Humphreys 2005; Taylor 2006) on videogames as significant sites of learning and social

interaction. It explores the specific mechanisms and processes of these interactions by offering an analytic framework grounded in evolutionary externalism, social learning and emergent institutions. Specifically, our approach departs from the narrower neuro-cognitive science approach, as exemplified, for example, in the work of neuroscientist Susan Greenfield (2008), which seeks to explain what videogames do to people, by affecting their brains. We call this the *internalist* perspective (i.e. videogames change people's brains). We contrast it with the *externalist* perspective of cultural science (Herrmann-Pillath 2010), in which videogames are sites of *social learning*, where knowledge is increasingly externalised and where players must, in effect, learn how to learn. Of course videogames as a vehicle and opportunity for learning is by now a common claim in the fields of media studies and game studies (Gee 2007; Williamson Schaffer 2008).

Our proposal is that cultural science, grounded in evolutionary and complexity theory, offers a more specific and precise understanding of the mechanisms and processes of this learning. Neuroscientists such as Greenfield, as well as social media commentators such as Nicholas Carr (2010), worry about the detrimental effect of videogames and other new digital media on human cognitive development. They tend to argue a 'videogames are bad' line because they are said to shorten attention spans, amplify rewards to basal 'yuk-wow' (as Greenfield styles it) visual stimulus responses, and generally demotivate and disincentivise the sort of deep, critical and reflective thinking that the critics identify with healthy cognitive functioning. Our argument does not challenge this internalist position directly – neither of us is a neuro- or cognitive scientist – but rather seeks to elaborate on the socio-cultural context of videogames, which is the starting point for media studies and games studies approaches, but more specifically in relation to *evolutionary social learning*.

This is the externalist hypothesis that begins by recognising that not all useful knowledge resides in the minds of individual agents (the implicit internalist and cognitive-science approach), but rather that useful knowledge as often lies in the minds of others or is embedded in a situated environment (Potts *et al* 2008a). Effective action will necessarily often require finding and successfully connecting with that distributed knowledge, including the challenge of learning of what needs to be learnt. This model, we emphasise, is conceptually equivalent to the distributed knowledge hypothesis in Austrian and Evolutionary economics (Dopfer and Potts 2008). Our externalist model in effect seeks to apply this same distributed knowledge and adaptive learning hypothesis to the particular study of videogames.

From an externalist cultural science perspective, videogames look less like degenerate forays into pure basal pleasure-seeking and more like sites of social learning and experimentation in the use of distributed knowledge and capabilities. This extends scholarly interest in them beyond a narrow focus on sub-genres of new media. Instead, videogames may be seen as a model (an exemplary live experiment, as it were) of distributed social learning under new technologies. Our concern here is to propose a new framework for the study of gamers' behaviour and the organisational, market and

institutional ecologies in which their actions occur, all from an analytic perspective that recognises the game artefact as an intermediating social network technology.

Importantly, the application of an evolutionary approach does not invariably lead down an internalist path (for example, towards evolutionary psychology or neuroscience), but can strengthen and build on the insights of media studies and games studies, by establishing the mechanisms and processes of social learning, or what Henry Jenkins (2006a) calls 'collective intelligence'. The cultural science approach is not necessarily evolutionarily 'reductionist' (seeking evolutionary behavioural or cognitive foundations for behaviour), but may build directly on detailed *environmental* analysis, just as evolutionary biology itself emerged in partnership with geology and later ecology.

The starting point for standard neuroscience and brain-science approaches to understanding videogames is an effort to 'get into the heads' of gamers and assume that the activity or practice of gaming at the behavioural level is primarily about what happens inside our brains and how this then influences behaviour. But what if these sciences are looking in the wrong place? What if the most interesting aspect of gaming phenomenon is not what is playing out inside our heads but, instead, how by playing these games and by playing and connecting with others through these games, we are literally learning to play *outside of our heads*? If so, then this suggests a new model of the innovation process.

Our contention in this paper is that most videogames studies and overlapping sciences are currently looking in the wrong place in their endeavour to figure out what's going on. Games studies are for the most part ahead of the curve in this respect, but there is still a marked reluctance, verging on outright indifference, to use evolutionary theoretical approaches. But the behavioural and brain sciences have arguably missed this mark by the most. Commitment to reductive explanation of how games (external cause) affect brains (internal mechanism) has led this approach to overlook completely the social and interactive dimensions of learning and emergent structure. The most interesting thing about videogames, from the cultural science perspective, is not what is happening in – or 'to' – our heads, but how we can understand mediated 'behaviour' in a different way.

We see gaming as evolutionary social learning in the spread of games such as *Minecraft* (2010), which forms the case study of this paper, as introduced below. It shows how gamers are playing such games in highly social spaces through new digital technological affordances. This is distributed intelligence or cognition at work – enabled through a range of devices and 'technology actors' (as conceptualised in economic sociology) that, in the process, thoroughly *mediate* learning and do not just transport, convey, or deliver the content through some kind of neutral network connectivity. This 'externalism' (where knowledge, choice, reason and meaning are the *result* of relational 'connected brains' rather than the *origin* of individual action) is the basic starting point for a cultural science contribution to describing, studying, researching, modelling, and analysing videogame culture. It provides a new context for the study of innovation.

2   How we play: Minecraft

Consider the example of *Minecraft*, an independently developed videogame from Markkus Persson, which has gained significant attention and popularity from mid 2010 through online gamer networks. *Minecraft* is simply described on the website (where you can purchase the Alpha version for €9.95) as:

> ... a game about placing blocks to build anything you can imagine. At night monsters come out; make sure to build a shelter before that happens (www.minecraft.net).

Immediately above that message is a popular player-created YouTube clip demonstrating what can be created or 'crafted' in the *Minecraft* game environment. As of mid-December 2010, the Alpha version had attracted almost 2.5 million registered users and over 750,000 online purchases. It had also garnered considerable online game press coverage with favourable if not glowing reviews. Writing on *cnet.com*, Rich Brown describes the game:

> Against the backdrop of multimillion dollar AAA games and fun-yet-bite-size downloadable titles, indie game *Minecraft* is an aberration. The product of lone developer Markkus 'Notch' Persson, *Minecraft* has ancient-looking graphics, no plot, and generates massive, sandbox game worlds with seemingly infinite creative possibilities, but no clear instructions telling you what to do or how to get started. Despite that seemingly user-unfriendly formula, *Minecraft*'s buzz is so strong the server hosting its Web site crashed this weekend under the weight of incoming traffic. Spend an hour with *Minecraft* (which can easily spiral into two or three) and you'll quickly understand the reason for the enthusiasm around this indie hit. [1]

Jacob VanDerWerf, writing for *FiringSquad*, comments:
> What the heck is *Minecraft*? *Minecraft* is a sandbox-style building game with a variety of rather large blocks representing materials in the world's environment. Every map is procedurally generated with grassy plains, forested hills, sandy beaches, towering mountains, and most interestingly, sprawling networks of underground tunnels and caves. There is no real point of the game but to explore and build to your heart's content... *Minecraft* is all about exploration, adventure, and creativity. You can literally go anywhere and do anything, so use your imagination! I've barely scratched the surface of what is possible. [2]

When playing *Minecraft*, you start as an avatar in a randomly generated world of rather rudimentary textured bocks. *Minecraft*'s compelling gameplay appeal certainly is not found in cutting-edge 3D graphic splendour. This game is no *Call of Duty Black Ops* in the graphics department, although the graphics do have a certain nostalgic charm. The environment is huge with an expanse of mountainous terrain bounded by water. At the

start, though, you have no idea what to do. You start with no inventory and no clear way of interacting with the environment. There are no convenient non-player characters wandering by to tell you where to head or what your mission or quest goal may be, although you do notice blocky objects moving around that resemble chickens and sheep. So how do you learn to play this game and what is *Minecraft*'s appeal? Why are so many gamers urging each other to play and indeed to purchase the Alpha version before the price doubles to €20 when it reaches Beta stage in late December 2010?

Players find *Minecraft* intriguing and compelling precisely because the game requires them to figure out through creative experimentation and trial-and-error play what can be done in this 'sandbox' play environment. And they are finding much of this out from each other. With a little wandering around and playful experimentation you quickly discover that you can gather various resources from the environment such as wood and coal. Then you discover that you can 'craft' (or combine these resources in various mixes) to create useful objects, including tools such as picks, shovels and hatchets. You use these tools to harvest further resources such as dirt, rocks and stone. Then the fun starts, because you're caught up in the creative joy of crafting your own *Minecraft* world. It quickly becomes apparent that you can terraform and craft the world to create quite elaborate structures. When you start out, the world has no artificial structures. But after many hundreds of hours of making and constructing, you may have created elaborate castles or intricate below-ground mine complexes, complete with mine-cart systems for moving mined minerals.

As well as *Minecraft*, there are many other similar 'making and constructing' games, such as *Spore* and *LittleBigPlanet*. The case can be made that, as platforms for creative expression, such games do not at all fit Susan Greenfield's unfortunate characterisation of new media and videogame culture as 'yuck wow'. As a starting point, it is a mistake to generalise videogame or new media culture as homogeneous, overlooking the diverse forms and expression they take, from first-person shooters such as the *Call of Duty* series through to creative sandboxes such as *Minecraft*. In offering this observation we are not suggesting *Minecraft* is a better, more creative or less objectionable form of videogame entertainment. Games such as the *Call of Duty* series also have their distinct creative learning cultures. But it is necessary to take the time to undertake the careful and sensitive research to explore and understand these emerging cultures. It certainly does not help when expressions of distaste, such as Greenfield's 'yuck and wow', stand in for the scientific research that is needed. Such exclamations merely express a preference for one kind of taste culture over another (e.g. that traditional or canonical literature is 'better' than videogames for children and young people); they don't advance our understanding of what is actually occurring with and through this emerging digital play culture.

Videogames are, we argue, a significant site of an externalised form of social learning. The process can be observed though the ways that players figure out how to go about crafting in *Minecraft*; it is open to observation because some players are recording their *Minecraft* play sessions as a series of tutorial guides that explain how to survive in the *Minecraft* world, how to craft various tools, and how to get started with making various structures. The best and most popular of these, such as Halnicholas's 'Building Mega-objects in *Minecraft*',[3] describe how to use its various capabilities ingeniously to make a replica of Star Trek's USS *Enterprise*. The point here is not to celebrate the individual creative genius of a player such as Halnicholas (although it can certainly be admitted). The social-learning and externalism argument is not simply that these *Minecraft* players are learning from each other through YouTube videos. That is obvious. The point is how they are *learning to learn*.

Tutorial series such as davidr64yt's 'Adventures in *Minecraft*',[4] now running to over 30 episodes, function as an entertaining videoblog journal of how he learnt to play. Episodes share with viewers various crafting opportunities and skills that he has discovered, and they regularly reference other players' 'Let's Play *Minecraft*' YouTube videos. Indeed, these videos are such a significant part of playing and enjoying *Minecraft* that they are now featured on the official *Minecraft* community forum. Thus, the videos are clearly not ancillary to the game-play experience of *Minecraft*. They are core and fundamental. Indeed, it can be argued that these 'social network market' (Potts et al 2008b) initiatives drive *Minecraft*'s emerging commercial success. The most effective marketing initiative for this indie game is not a traditional marketing campaign as would be pursued by one of the traditional games publishers. Instead, the players themselves are making and spreading promotional videos. An example is Vareide's popular 'Minecraft Fanmade Trailer.[5] Supported by a ripped soundtrack from the film *Inception*, this video has now received almost 1.5 million views. Author Banks was first alerted to *Minecraft* via a Tweet linking to this video. Players also regularly comment on forums that they purchased and downloaded *Minecraft* after viewing a player-made 'Let's Play *Minecraft*' YouTube video. *Geek.com* ran an article called 'If you are not playing *Minecraft* you will after watching these'.[6] It features player-made *Minecraft* YouTube videos.

We are not seeking here to make an entry-level observation about the success of a bottom-up, consumer-driven viral marketing campaign; or to counter the negative evaluations of others with positive valuations of our own. Rather, our point is to provide evidence of how players are learning from each other. Adopting Henry Jenkins's (2009) recent idea of *spreadable media*, what's spreading here is not just media content; it's social learning as such. The YouTube clips are not significant because of the creativity or otherwise of their content, as for example the creativity involved in terraforming a *Minecraft* environment into the USS Enterprise. What's really significant is that players are *imitating and copying behaviours* about how to learn and to collaborate through and in online networks. We next need to ask: what are the mechanisms of these social learning processes and relationships? How do we analyse and describe these distributed learning dynamics? What are the mechanisms and processes of this social learning?

3   Cultural Science & Externalism

A cultural science of videogames is developed by applying the cultural science method, which emerges as the ongoing product of the 'evolutionary turn' in the domain of culture (Dutton 2009, Boyd 2009, Konner 2010; and see this website, *passim*). As Carsten Herrmann-Pillath argues, it *completes* the Darwinian revolution because it 'removes the notion of intelligent design from its final and seemingly invincible retreat; that is, the human mind.' Thus, a cultural science studies culture and meaning as 'the emergent property of interactions in the material world' (Herrmann-Pillath 2010: 7-8).

As well as being founded in non-reductive or emergent *naturalism*, cultural science also adopts and works from a fundamentally *externalist* perspective. Reason is an *outcome* not an *input* of socially networked communicative relations (Hartley, 2010). Meanings and meaningful action in the material world cannot be understood apart from the complex systems and networks within which they are generated and enacted.

In *Minecraft*, therefore, what is going on cannot be understood through the model of individual learning that neuro- and cognitive-scientists use to study humans and other animals. Although what individuals do is obviously an elementary component, it is not the most useful point of analytic focus if one intends to develop a *cultural* science of videogames. Instead, better focal points occur in the emergent levels beyond and between individuals, where learning is distributed and institutions (organisational forms) are forming. These learning processes are, in essence, closer to the types that economists study in relation to innovation processes and economic evolution (Beinhocker 2006, Arthur 2009). *Minecraft* is 'just a game' but it is also a model for the broader forms of distributed situated learning processes powered by the new digital social media technologies that are currently reshaping cultural and economic systems. This in turn is very close to the idea of 'collective intelligence' that Henry Jenkins develops in *Convergence Culture* (2006: 26-29), drawing on the work of Pierre Levy. Jenkins writes:

> What holds a collective intelligence together is not the possession of knowledge – which is relatively static, but the social process of acquiring knowledge – which is dynamic and participatory, continually testing and reaffirming the group's social ties.

A cultural science approach to videogames thus opens a pathway to the study of a basic principle in the dynamics of all cultural systems, namely *emergent social learning*. This requires a *distributed* and *externalist* perspective that we suggest can be modelled through the cultural science concept of *multiple games*.

First, *Minecraft* is a model of *distributed learning* over a complex and uncertain environment that, moreover (and just like actual socio-economic systems), changes as and

because agents explore it. It is of course still individual agents who are figuring out what to do and adapting their behaviours and choices in response to feedback. Yet it is impossible to comprehend this process, let alone model it, purely from individual experience. It is a social and emergent learning process because it is a discovery process that builds upon itself: it is an 'autopoietic learning' in an evolutionary environment (Kauffman 2000).

Second, and because of this, agents are engaged in learning processes that are heavily networked and emergent (Howkins 2009, Potts 2011) and which involve significant social and institutional structures, or social technologies (Nelson and Sampat 2001; Arthur 2009). The 'rules and technologies of learning' are mostly external to agents, in networks, in artefacts, in social institutions, etc., and not entirely internal to 'the brain' as standard cognitive science learning models suppose (while economic sociology models don't; e.g. Callon 1998). This requires an externalist position, which is invariably bound up in an evolutionary or emergent complex systems framework (Herrmann-Pillath 2009, Dopfer and Potts 2008).

4   Multiple games

A model however, was proposed by Banks and Potts (2010) in the concept of *multiple games*, first developed by Page and Bednar (2007). A multiple game is the context of a singular strategic 'play' in multiple environmental contexts (such as a market and a non-market context; or a social and individual context). Most videogame play, we suggest, is that of multiple games contexts. We further propose that this multiple games play is the essential behaviour in most contexts of social learning and innovation.

A multiple game, we propose, is the basic analytic unit of cultural science when focused on social learning and emergent behaviour and institutions. A detailed account of multiple games theory can be found in Banks and Potts (2010).[7] The basic idea is that because agents need to maintain a *coherence of identity* in navigating a world of singular behaviours in overlapping incommensurable contexts, they will resort to finding negotiated rules for action, and these rules will mostly be sourced from and negotiated with the social environment itself.

Multiple games are what each of us plays every day when we make choices to act in a consistent way in the overlap of sometimes complex, conflicting and uncertain multiple environments. What may appear as an irrational choice in each dimension may nevertheless be evolutionarily rational in a multiple games context, where an agent endeavours to maintain a coherent identity that has the external consequence of driving and shaping institutional evolution.

Where, then, is the multiple game in *Minecraft*? Is it an entertaining sandbox experience of creative expression; is it demonstrating skills and competence in attracting attention in context of attention economy; or, is it a game of peer-to-peer social learning? It involves action on networks of sharing and copying information, the most important of which is in relation *attention* (Lanham 2006). The question for players is what to pay attention to; in other words, how to learn.

The multiple game in *Minecraft* is precisely this negotiation and settlement of roles and values into a single action in a complex open environment. This problem is faced by many agents simultaneously and so they will invariably take cues from each other in what Potts *et al* (2008b) call *social network markets*. This is simply a dynamic statement of endogenous preferences in conditions of distributed information that tend action toward specialisation and exchange. In *Minecraft*, these specializations unfold as a bottom-up process, facilitated by emergent interactions and an economics of attention.

A major issue facing gamers is *uncertainty* in characterising and evaluating what is going on. What are the pay-offs, benefits and incentives at stake in the game? One hypothesis from a cultural and media studies perspective is that of exploitation; i.e., that this game is about shifting labour costs and using some kind of distributed out-sourcing to exploit a talent pool of amateur consumer labour (see e.g. Ross 2009). Yet Banks' ethnographic research shows that gamers often shift comfortably between signalling a 'commercial-benefit' ethic (i.e. 'I'm doing this to show off my skills to get a job'), and signalling a communitarian ethic (i.e. 'I'm doing this as a social gift or signal') (Banks forthcoming; also see Banks & Humphreys 2008). Professionals and senior managers in the firms would similarly deploy very different registers in understanding and describing their relationship with the gamers. All of this can also lead to tensions, misunderstandings, disputes and disagreements.

An alternate hypothesis would therefore be to *expect* this kind of uncertainty and ambiguity in such an emergent and messy situation. Because institutions and associated roles and identities are unsettled, we would therefore expect to see new ones and perhaps even the existing ones eventually stabilise through the forces of social learning feedback. The preferences, the benefits, costs and pay-offs will eventually become clearer through the process of continuous interactive 'play'.

But in the playing of these games, are we are also observing a kind of skilling-up and scaling-up in externalised action. This will unfold as an emergent distribution of the competences and skills and choices needed to effectively participate in these relationships and make these decisions. Games such as *Minecraft* therefore offer a model of cultural learning for how to effectively and playfully distribute intelligence, knowledge and innovation. Moreover, this occurs mostly in the context of learning how to learn. By playing these multiple games, agents develop both identities and competence.

5   Economic sociology as a cultural science

Economic sociology has illuminated many aspects of our cultural science approach to how videogamers learn.[8] Yet while economic sociology is naturally externalist, it is not always evolutionary. Many previous writers – such as Latour's (2005) 'actor-network theory' and Callon's (1998, 2007) theory of 'market devices' – have captured crucial aspects of this process but have remained unwilling to translate it into a scientific model.

For this, we need to turn to David Stark's (2009) recent work *The Sense of Dissonance: Accounts of Worth in Economic Life*. An economic sociologist and ethnographer, Stark draws on four ethnographic studies of very different companies (so a comparative ethnographic approach) to develop a compelling proposal about innovation and entrepreneurship. He asks what counts as worth or value, and how do we evaluate that, in circumstances of quite profound uncertainty and overlapping valuation contexts; i.e. the environments the organisations he studies are encountering and struggling with. He finds that they devote considerable resources to limiting and clarifying the logics and tools they should be using to determine and evaluate worth.

Stark's thesis is that firms are perhaps, and in an evolutionary context at very least, better served by allowing multiple logics of worth and not discouraging the resulting exploration of uncertainty. He advises developing organisational forms (heterarchy) to harness the benefits and opportunities of such 'dissonance' arising from these structural folds over value (cf. Burt's concept of structural holes) (17). He became interested in how the actions of agents in these firms were made possible by the uncertainty and that they were 'benefiting from not asserting or fixing singular orders of worth and evaluation but maintaining an ongoing ambiguity among the co-existing principles' (Stark 2009: xiv). Why? Because this dissonance became an opportunity for organisational reflexivity from the ongoing rivalries and disputes, which pointed to possibilities for entrepreneurship from exploration and recombination.

The kinds of agents and agency that emerge from Stark's account are those centred about search and navigation. His suggests a new kind of search in which 'you do not know what you are looking for but will recognise it when you find it' (Stark 2009: 2-6). The innovation process and problem for Stark thus lie in trying to recognise what is not yet formulated as a category and to make new associations or connections (Potts 2000, Earl and Wakeley 2010). Perplexing situations arise when there is uncertainty or 'principled disagreement' about what counts. Stark suggests that organisations and firms should endeavour to embrace such uncertainty and perplexing situations. Indeed, they should seek to generate them. The frictions generated should not be avoided at all cost, as they generate a 'resourceful dissonance'. He explains:

> Entrepreneurship, then, in this view exploits uncertainty. Not the property
> of an individual personality but, instead, the function of an organizational

form, entrepreneurship is the ability to keep multiple principles of evaluation in play and to benefit from the productive friction. (Stark 2009: 6)

This drives distributed understandings of entrepreneurship and of valuation, and requires calculation practices in which various, multiple orders of worth have 'distinctive and incommensurable principles of equivalence'.

These are the distinctive grammars and logics that underpin rational action within orders of worth. This leads to a new understanding of bounded rationality at work, not so much in terms of (internalist) cognitive limits to rationality, but rather in terms of an externalist rationality that calculates across particular (and often incommensurate) orders of worth. The results are plays of multiple games. As Stark puts it: 'multiple principles of evaluation are at play'. Stark's point is that these multiple orders of worth don't so much set up a problem of individual choice under uncertainty, but rather are expressly engaged in 'creating uncertainty and therefore opening opportunities for action'. Stark calls this value-conflict 'entrepreneurship at the overlap'. (13-19)

Problems of uncertainty are therefore not just limited to the resolution of the calculative powers of human actors, as if it were an artificial intelligence problem. Rather, they emerge as properties of an indeterminate situation. The problem is less 'what don't we know?' and more 'what cannot be known?'

Stark is careful to distinguish this from probabilistic risk. Entrepreneurship is less a reward for risk and more a reward for 'an ability to exploit uncertainty'. Austrian and Schumpeterian economists will all surely recognise this point. Stark (2009: 15) defines entrepreneurship as 'the ability to keep multiple evaluative principles in play and to exploit the resulting friction of their interplay.' Entrepreneurship exploits an indeterminate situation by keeping open diverse performance criteria rather than by creating consensus about one set of rules. Entrepreneurship is disruptive and centred about feedback driven recombination. The entrepreneur, in this view, is an insider to multiple games who is further engaged in the recombination of assets and positions to exploit these learning opportunities. Entrepreneurship not at the gap of different evaluation orders, but the productive friction that disrupts identities and organizational norms. It 'makes possible the redefinition, redeployment, and recombination of resources. In short, entrepreneurship occurs not at the gap but through the generative friction at the overlap of evaluative frameworks (Stark 2009: 13-19).

In the standard economic sociology triplicate of markets, hierarchies and networks, *network* invariably stands for alternative (elsewhere unclassified) coordinating mechanisms. Network is also used to describe otherwise unclassified changes in organisational forms. Economic sociologists study economic networks (as in the work of Mark Granovetter, etc), but Stark worries about adopting it as a label – analysis of patterns

of ties in network analysis. He argues that actors in these situations 'do more than communicate with or link to others. They also evaluate performance, justify their actions, and offer reasons to explain why things should be done this way instead of that' (Stark 2009: 24). This is also Latour's (2005) point with actor-network theory. These are '... patterns of ties but also sites in which actors engage in practices of justifying worth. Network ties are mechanisms of coordination but always alongside performance criteria and the evaluative principles on which they are based' (Stark 2009: 24).

Entrepreneurial opportunities thus arise that the point of the value-frictions created by the overlap of contending approaches. Evolutionary coordination and development takes place not despite but because of misunderstandings due to dissonance in overlapping value networks, or structural folds (Stark 2009: 191-3). This can be recast as a model of overlapping networks, and analysed in terms of insights about how these differing structures of social relations shape individual and collective behaviour. But the contribution of economic sociology is to highlight how these 'social agencies' also involves materials, technologies and tools, and not just human agents. This is why economic sociology is externalist, and why it fits within a cultural science framework.

Stark's 'situations' are *complex contexts* that reflect the fact that the actual context of most human action is rarely neatly decomposable and commonly consists of situations of *simultaneous multiple contexts* that do not permit multiple actions targeted to isolated value domains but more-often require a single action that plays-out across all contexts simultaneously: this is a *multiple game*. Our argument is that interactive videogaming in open uncertain worlds is a paradigmatic instance of a multiple game. And perhaps it is social learning for playing multiple games. Bruno Latour (2005:28) argues, for example, that 'the most common experience we have of the social world is that of being simultaneously seized by several possible and contradictory calls for regroupings.' This is the sense in which cultural studies and broader humanities can seek to connect to modern science by, in essence, figuring out ways of posing questions and seeking answers that conform to advancing models of actual human behaviour (of which most of the important recent insights having come from evolutionary theory) and with parsimony. A multiple games approach to social learning, as a research line in cultural science, may fit this bill.

In this manner, digital media studies can also contribute to a cultural science approach. For example, in their study of YouTube, Burgess and Green (2009: 69-74) argue that the value of YouTube and why it matters is not measured by the repository of content but more significantly by the skills and competencies acquired and shared through participation in the YouTube co-creative culture. This is emergent self-learning. Burgess and Green argue that approaching YouTube as a peer-learning platform involves how users share the technological and cultural competencies needed to navigate and innovate within this social network. These values and norms 'are collectively constructed, taught and learned as part of how the social network develops' (Burgess and Green 2009: 73). Also, as we see in the *Minecraft* case, this process of collective construction and learning is not simply about amateurs replacing media professionals, but how these identities and

practices are co-evolving and re-coordinating (Banks 2009). This is about the growth of knowledge and how we grow knowledge.

6   Conclusion

We have argued in this paper that videogames provide a good opportunity to study the sorts of social learning driven economic and cultural co-evolution that a cultural science can aim to elucidate. Videogames are a site of evolutionary social learning transactions that involve people originating and adopting new ideas by learning how to do new things and creatively experimenting with variations (Hartley 2009; Potts *et al* 2008a, 2008b; Potts and Cunningham 2008). Videogame play culture is significant not simply as a source of creative content, or even new ideas, but from its role in how the emerging identities and roles associated with these practices are adopted, adapted and retained, as for example in the transforming relationships between professional experts and amateurs and in the emergent unfolding of institutions that facilitate this process.

Ideas such as multiple games, emergent social learning and attention economy dynamics are not just about output of cultural products and content, or even the shifting of costs associated with these activities. More importantly, they concern complex dynamics of originating, adopting and retaining new social technologies. This perspective does not focus so much on questions of efficiently allocating resources, as in the standard economic model. Instead, it asks us to consider the challenges of coordinating knowledge in the context of open and self-organising systems in which adaptive learning behaviours and practices are crucial.

This concerns *how* the players and developers of games such as *Minecraft* are going about the activity of generating and sharing content and ideas. For example, how they gain attention for their content, or how they lobby the developers for changes, or how they share and extend their discoveries and learning with other players. This emergent model of social learning is why videogame culture matters. Moreover, we are seeing these 'growth of knowledge' dynamics play out through the commercial domain of popular entertainment forms, such as videogames and YouTube clips.

So we need to suspend the 'critical imperative' to stand in moralising judgment about the rights and wrongs of these emerging gaming phenomena until we have a better, rigorous and robust understanding of how these emergent processes of economic and cultural co-evolution are shaping and reshaping these relationships. We need to understand how the agents involved are navigating and negotiating the risks, costs, opportunities and potentials of videogame culture. We have proposed here that the multiple games approach can provide this in the form of an evolutionary cultural science.

We need analytical tools and models that combine the hermeneutic traditions of the humanities (such as richly detailed ethnographic case-studies) with complex and adaptive system models to better understand the phenomena of videogames culture and associated practices of emergent self-learning. Such an interdisciplinary cultural science research program as recently proposed by Hartley (2009) and Herrmann-Pillath (2010) is not a rejection of a humanities focus on activities of meaning and sense making.

Cultural Science thus seeks to combine analytic frameworks and perspectives from evolutionary economics, complexity science and cultural and media studies in order to better understand the dynamics of cultural change by focusing on the interactions and connections between these domains as an emergent process of cultural and economic co-evolution. Cultural norms and values of participation, new forms of identity and associated cultural meanings are fundamental to these dynamics. Complex systems researcher Melanie Mitchell (2009: 184), for example, recently proposed that understanding the meaning of complex system situations and events is one of the most profound and far-reaching challenges confronting complexity sciences. We suggest that humanities disciplines such as cultural studies have valuable insights to offer in this area, and even when we're 'just playing with games'.

Notes

[1] Brown, R. (2010) 'Indie game *Minecraft* offers tense creative charm.' Online: http://news.cnet.com/8301-17938_105-20016964-1.html)

[2] (www.firingsquad.com/games/minecraft_review/)

[3] (www.youtube.com/watch?v=kn2-d5a3r94&feature=related

[4] (www.youtube.com/user/davidr64yt#g/c/E005D335B57338D1)

[5] (www.youtube.com/watch?v=FaMTedT6P0I)

[6] (www.geek.com/articles/games/if-you-are-not-playing-minecraft-you-will-20100920/)

[7] Multiple games theory (Page and Bednar 2007) is a recent extension of game theory that analyses choice situations in which an individual agent uses a single strategy to interact in multiple conceptual spaces, or 'games', that are otherwise incommensurable. Standard game theory allows considerable complexity in the agents, strategies, rules of the game, but always supposes that only one game is being played. A multiple game differs in that a *single strategy* is played over multiple games, with each game representing a different set of rules, payoffs and even players.

[8] Actor-Network Theory of Bruno Latour (2005) and its take up in economic sociology by Michel Callon (1998, 2007) and Donald Mackenzie (2006) – action/agency is distributed. Common Reference points include Edwin Hutchins's Cognition in the Wild (1995). So for example, Latour (2005) following Callon and Hutchins in *Reassembling the Social* comments on status of individual participants or agents. How we are made to be individuals – individualisers (207) or *plug-ins.* Competence is something we plug-in: "To transform yourself into an active and understanding

consumer, you also need to be equipped with an ability *to calculate* and *to choose* (209). There are plug-ins circulating to which you can subscribe, and that you can download on the spot to become locally and provisionally competent (210). "Cognitive abilities do not reside in 'you' but are distributed throughout the formatted setting, which is not only made of localizers but also of many competence-building propositions of many small intellectual technologies" (211). Also See Andy Clark's *Supersizing the Mind: Embodiment, Action, and Cognitive Extension* (2009).

References

Arthur, W.B. (2009) *The Nature of Technology*. Free Press: New York.

Banks, J. (forthcoming) *Co-creating Videogames*. Bloomsbury Academic: London.

Banks, J. (2009) 'Co-creative Expertise: Auran Games and Fury – A Case Study. *Media International Australia* 130 (February): 77-89.

Banks, J. and Humphreys, S. (2008) 'The Labour of User Co-creators: Emergent Social Network Markets? *Convergence: The International Journal of Research into New Media Technologies* 14(4): 401-18.

Banks J, Potts J (2010) 'Consumer co-creation in online games' *New Media and Society*. 12(2): 253-270.

Beinhocker, E. (2006) *The Origin of Wealth: Evolution, complexity and the radical remaking of economics*. Harvard Business School Press: Cambridge (MA).

Boyd, B. (2009) *The Origin of Stories: Evolution, cognition and fiction*. Harvard/Belknap Press: Cambridge (MA).

Burgess, J., Green, J. (2008) *Youtube: Online Video and the Politics of Participatory Culture*. Polity Press: London.

Callon, M. ed. (1998) The Laws of Markets. Blackwell: Oxford.

Callon, M. (2007) 'What does it mean to say that Economics is Performative' in Donald MacKenzie, Fabian Muniesa, and Lucia Siu (eds), *Do Economists Make Markets? On the Performativity of Economics*, pp. 311-57. Princeton University Press: Princeton. 311-57.

Carr, N. (2010) *The shallows: What the internet is doing to our brains*. WW Norton: New York.

Castronova, E. (2005) *Synthetic Worlds: The Business and Culture of Online Games*. University of Chicago Press: Chicago.

Dopfer K, Potts J (2008) *The General Theory of Economic Evolution*. Routledge: London.

Dutton, D. (2009) *The Art Instinct: Beauty, pleasure and human evolution*. Oxford University Press: Oxford.

Earl, P.E., Wakeley, T. (2010) 'Alternative perspectives on connections in economic systems' *Journal of Evolutionary Economics*, (forthcoming)

Gee, J.P. (2007) *What Video Games Have to Teach us about Learning and Literacy* (2nd Ed.). Palgrave Macmillian: New York

Greenfield, S. (2008) *ID: The quest for identity in the 21st century*. Sceptre: London.

Hartley, J. (2009) *The Uses of Digital Literacy*. University of Queensland Press: Brisbane.

Hartley, J. (2010) 'Whose creative industries?' Introduction to Lucy Montgomery, *China's Creative Industries: Copyright, Social Network Markets and the Business of Culture in a Digital Age.* Cheltenham: Edward Elgar.

Herrmann-Pillath, C. (2010) *The Economics of Identity and Creativity: A cultural science approach*. University of Queensland Press: Brisbane.

Howkins, J. (2009) *Creative Ecologies*. University of Queensland Press: Brisbane.

Humphreys, S (2005) 'Productive Players: Online Computer Games' Challenge to Conventional Media Forms.' *Communication and Critical/Cultural Studies* 2(1): 36-50.

Hutchins,E. ((1995) *Cognition in the Wild*. The MIT Press: Cambridge, Mass.

Jenkins, H (2009) 'If it Doesn't Spread, It's Deaf (Part One): Media Viruses and Memes'. On Confessions of an Aca-Fan: The Official weblog of Henry Jenkins, URL (Consulted 10 December 2010) http://www.henryjenkins.org/2009/02/if_it_doesnt_spread_its_dead_p.html

Jenkins, H. (2006a) *Convergence Culture: Where Old and New Media Collide*. New York University Press: New York.

Jenkins, H. (2006b) *Fans, Bloggers, and Gamers: Exploring Participatory Culture*. New York University Press: New York.

Kauffman, S. (2000) *Investigations*. Oxford University Press: Oxford.

Konner, M. (2010) *The Evolution of Childhood*. Belknap Press: Cambridge (MA).

Lanham, R. (2006) *The Economics of Attention*. University of Chicago Press: Chicago.

Latour, B. (2005) *Reassembling the Social: An Introduction to Actor-Network Theory*. Oxford University Press, Oxford.

MacKenzie, D. (2006) *An Engine, Not a Camera: How Financial Models Shape Markets*. The MIT Press: Cambridge, Mass.

Mitchell, M (2009) *Complexity: A Guided Tour*. Oxford University Press: Oxford.

Nelson, R., Sampat, B. (2001) 'Making sense of institutions as a factor shaping economic performance' *Journal of Economic Behaviour and Organization* 44: 31–54.

Page, S., Bendnar, S. (2007) 'Can game(s) theory explain culture? The emergence of cultural behavior within multiple games' *Rationality and Society*, 19(1): 65–97

Potts, J. (2000) *The New Evolutionary Microeconomics: Complexity, Competence and Adaptive behaviour*. Edward Elgar: Cheltenham.

Potts, J. (2011) Creative Industries and Economic Evolution. Edward Elgar: Cheltenham (forthcoming).

Potts, J., Cunningham, S. (2008) 'Four models of the creative industries' *International Journal of Cultural Policy* 14(3): 233–48.

Potts, J., Cunningham, S., Hartley, J., Ormerod, P. (2008) 'Social network markets: A new definition of creative industries' *Journal of Cultural Economics*, 32: 167–85.

Potts, J., Hartley, J., Banks, J., Burgess, J., Cobcroft, R., Cunningham, S., Montgomery, L. (2008) 'Consumer co-creation and situated creativity' *Industry & Innovation*, 15(5): 459–74.

Ross, A (2009) *Nice Work if you can get it: Life and Labor in Precarious Times*. New York University Press: New York.

Stark, D. (2009) *Sense of Dissonance: Accounts of Worth in Economic Life*. Princeton University Press: Princeton.

Taylor, T. L. (2006) *Play Between Worlds: Exploring Online Game Culture*. The MIT Press: Cambridge, Mass.

Williamson Shaffer, D. (2008) *How Computer Games Help Children Learn*. Palgrave Macmillian: New York.

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Maxis. *Spore*. Electronic Arts, 2008.

Media Molecule. *LittleBigPlanet*. Sony, 2008.

Mojang Specifications *Minecraft Alpha*, 2010.

Treyarch. *Call of Duty: Black Ops*. Activision, 2010.