Linguistic Capital and Development Capital in a Network of Cultural Producers: Mutually Valuing Peer Groups in the 'Interactive Fiction' Retrogaming Scene

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Abstract

This article reports on a mixed-methods study of the cultural valuing of 'interactive fiction' or 'text adventure games': a formerly commercial videogame genre sometimes associated with electronic literature but here argued to be best understood in context of the under-researched phenomenon of 'retrogaming' or 'old school gaming'. It is argued that a model for the study of retrogaming scenes is provided in Lena and Peterson's account of 'traditionalist' musical genres, and that these in turn exhibit similarities with Bourdieu's 'field of restricted production'. On the basis of qualitative analysis of interviews and documents and quantitative analysis of valuing behaviour on a website used by the interactive fiction community, it is proposed that entrance into the mutually-valuing peer group of interactive fiction developers is facilitated by possession of two intangible resources: linguistic capital (in the form of proficiency in Standard English) and development capital (in the form of expertise with programming languages specific to the production of interactive fiction), where

development capital is a new concept that may be extensible to other technically-oriented digital cultures (for example, the working cultures of professional software developers and the communities that form around open source projects).

Expressions of value in the form of star ratings were collected procedurally through data scraping, and represented as a directed graph. Seidman's k-core was innovatively used as an instrument for detecting mutually-valuing peer groups within that graph. It is argued that this methodology has general application for the study of cultural value and its production within social networks (both online and off), including networks associated with more established cultural fields such as art and literature.

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Introduction

One of the most important processes in cultural production is that of valorisation, that is, the establishment of some cultural goods as 'better' than others (see Allen and Lincoln, 2004: 873–874). This process aggregates multiple acts of cultural valuing on the part of more or less influential individual social actors (see Allington, 2013). Along with other cultural processes, cultural valuing is increasingly mediated through online interaction, necessitating the development of new methodologies for cultural sociology – including the procedural gathering of data (see Allington et al., 2015). Social network analysis is a powerful way of exploring the social relationships implied by procedurally-gathered data (e.g. Lewis et al., 2008; Paolillo, 2008). Applied to the study of acts of valuing, it can be used to study patterns of affinity and antagonism among cultural producers (De Nooy, 1999) as well as to study cultural inequalities and exclusions, whether by studying valuing relationships between demographic groups (De Nooy, 2008; Allington et al., 2015) or by identifying mutually-valuing peer groups operating within cultural fields as theorised by Bourdieu (Allington, 2013).1 This article takes the latter approach, with its focus on procedural identification of mutually-valuing peer groups, which it innovatively identifies with the social network analytic concept of the k-core (Seidman, 1983). The circulation of peer esteem is fundamental to Bourdieu's (1993b [1985]: 115) conception of the 'field of restricted production' in which art and literature are produced, and correlates with long-term consecration even in a mass medium such as cinema (Allen and Lincoln, 2004: 884). Success in art and literature has been analysed as a return on an investment of resources, especially economic and social capital (Bourdieu, 1993a [1983]: 67–68; and see Savage et al., 2005 for detailed explanation of 'capitals' in field theory), and it is here proposed that possession of intangible resources or capitals may play a role in determining who may enter into mutually-valuing peer groups, not only in the field of restricted production but also in the

communities that produce and value what Lena and Peterson call 'traditionalist' genres (2008). These communities are here argued to possess notable similarities with the field of restricted production: an idea less controversial than might at first be supposed, as Bourdieu's analysis of the field of restricted production has also been applied to jazz (see Lopes, 2000), no less than three subgenres of which are analysed as traditionalist by Lena and Peterson (2008: Table 2). Lena and Peterson's focus is on musical genres, but this article focuses on the community that values the cultural form known as 'interactive fiction' or 'IF'. As this article will acknowledge, IF has been claimed as a form of electronic literature, which would associate it with the field of restricted production. However, it is argued below that it can better be analysed as a form of 'retrogaming', and thus as a traditionalist computer software genre (albeit that traditionalism provides key similarities with the field of restricted production). Enthusiasts for the form – the self-styled 'IF community' – are sufficiently numerous to make data scraping and quantitative network analysis necessary if a 'whole population' approach is desired (see Savage and Burrows, 2007). Moreover, this community's acts of valuing are relatively straightforward to track because they occur publicly via the internet: as Van Dijk notes, the IF community 'ha[s] no other material or immaterial mode of existence … than [online] exchanges' (2014: 98). This means that, in addition to its intrinsic interest as an example of the little-studied phenomenon of retrogaming culture, the IF community makes a particularly straightforward case study for a methodological approach with wider application. That approach involves providing a sociohistorical account of a cultural form together with its valuing community, identifying resources that appear to play a role in the valuing of that form by that community, then modelling the community's valuing behaviours as a network and thereby identifying a core of producers who value each other's work, and finally comparing all producers to those within the network core in terms of evidence for the possession of these resources. While the only previously published sociological study of the IF community employed qualitative data drawn from Usenet (Van Dijk, 2014), this article focuses on quantitative data procedurally gathered from the Interactive Fiction Database or IFDB (www.ifdb.tads.org), a widely-used IF community institution founded in 2007 by Michael J. Roberts. Email interviewing was employed as a source of qualitative data by which to contextualise the quantitative findings.

Sociohistorical Context

'Interactive Fiction' and the Interactive Fiction Community In academic contexts, the term 'interactive fiction' is ambiguous, sometimes denoting 'literature delivered via software rather than print books' (Ziegfeld, 1989: 341), sometimes any form of computer game involving a narrative element (see e.g. Tavinor, 2005), and sometimes (see e.g. Niesz and Holland, 1984) the highly specific form of videogame whose first exemplar was Adventure (Crowther, 1976; Crowther and Woods, 1977; see Jerz, 2007), whose first commercially-published exemplar was Adventureland (Adams, 1978), and whose bestselling exemplar was Zork I (Blank et al., 1980). It is the latter sense that is employed here and in all other recent studies of the form, and the only sense that is customarily abbreviated to 'IF'. Videogames such as these were originally described not as 'interactive fiction' but as 'adventures', 'adventure games', 'text adventures', or 'text adventure games': all terms that essentially meant 'games similar to Adventure'. In common with other videogame genres (e.g. platform games, shooters, maze games, and roguelikes – the latter of which were also named in honour of an originary work), games of this type model a simulated world within which there is a user-controlled entity whose goals are adopted by the player. In contrast with most other videogame genres, these games employ a wholly or primarily textual interface modelled on

the command line interface (CLI) of early computer terminals (see Figure 1, which depicts CLI-style gameplay in Zork I). The commercial market for such videogames collapsed in the late 1980s (see Aarseth, 1997: 102; Montfort, 2005: 166–168), but they have since continued to be produced on a non-commercial or hobbyist basis by members of the IF community (see Van Dijk, 2014). It is difficult to estimate the current or former size of this community, although it is instructive to note that, at the time of data collection, the website from which quantitative data were collected had nearly 3000 registered accounts and held details on works of IF by something approaching 2300 developers. These developers are not, for the most part, divisible into programmers, designers, and writers, firstly because the commercial heyday of IF coincided with a period in which such roles had not become clearly differentiated in the entertainment software industry more generally – Scott Adams was responsible for all aspects of Adventureland (1978), just as Tomohiro Nishikado was responsible for all aspects of the contemporaneous Space Invaders (1978), for instance – and secondly because the definitional requirement for formal similarity with works that could be implemented on 1970s hardware has enabled development to continue in the auteur model by eliminating the need for dedicated visual artists, for example, or for teams of programmers capable of engineering high-performance code.

Interactive Fiction as Traditionalist Videogame Genre

As noted above, the cultural form discussed here has occasionally been co-opted as a form of 'electronic literature' (cf. Electronic Literature Organisation, 2012; Hayles, 2008; Hayles et al., 2006; Montfort, 2005; Rettberg, 2009). This is probably accounted for both by its textual medium and by the name 'interactive fiction'. This ambiguous term was initially used by Adventure International, the publisher of Adventureland (see above), albeit for a different product line, and then employed in the marketing of the videogame genre discussed here by Infocom, the publisher of Zork I (see above and Figure 1), probably because of a desire to expand the market for such games by retailing them through conventional bookstores. There is therefore justice in Aarseth's complaint that scholarly use of the term exemplifies the uncritical acceptance of 'commercial rhetoric … by academics with little concern for precise definitions or implicit ideologies' (1997: 48). However, its use among the form's enthusiasts probably reflects the exceptionally high regard in which the best of the old Infocom games are still held, justifying its scholarly retention as an emic category, provided that care is taken to avoid burdening it with external associations, for example of literariness. Indeed, some of the few theorists outside the Electronic Literature Organisation to have studied IF have specifically denied its status as literature (e.g. Aarseth, 1997: 109, 127–128; Niesz and Holland, 1984: 122), and discourse within the IF community provides little or no support for the identification of IF with literature, electronic or otherwise. As Van Dijk observes, debates tend to frame works of IF as games, non-game references tend to be to genre fiction and to science fiction and fantasy movies rather than to works of literature, discussion of IF as literature is very limited, and discourse on the aesthetics of IF indicates that 'the genre of commercial computer games is more relevant to many IF-developers and to the technical and narrative questions they deal with' than is the genre of literary fiction (2014: 97–98). Moreover, members of the IF community typically refer to individual pieces of IF as 'games' and write of 'playing' IF (as quotations in this article will show). While members of the Electronic Literature Organisation have sometimes attempted to dissociate IF from games (Montfort, 2004: 312, for example, first defines a game as a 'contest' and then asserts that the contest-like aspects of IF are 'not fundamental'), it is here suggested that the most credible approach is to understand it, together with its associated community, as one among many active 'retrogaming' or 'old school

gaming' scenes, and to see the use of the term 'interactive fiction' within that community as expressive of the sort of nostalgia that animates all such scenes, and not as indicative of an affinity with electronic literature. Retrogaming scenes are organised around the valuing of obsolete commercial videogames, though their participants (typically people who enjoyed those games in their youth) may also create and play new games that mimic or target the hardware on which the originals were played. This general description also characterises IF and its supporting community, which – like Lena and Peterson's (2008) traditionalist musical genres – arose in response to the collapse of an 'industrial' phase of production. Many post-commercial IF games target an updated version of the same virtual machine used for the old Infocom games, and even those that do not for the most part provide essentially the same user interface. Moreover, at the time of data collection, the IF community remained dominated by fans of IF games released during the genre's commercial era, and in particular by fans of those IF games published by Infocom. This was apparent from documents produced within the IF community, and corroborated by the researcher's informants, for example the very longstanding community member who characterised subscribers to the community's main Usenet group as 'people who played Infocom games when they were kids'. Further interview statements confirmed that this characterisation generally held true, though several interviewees emphasised that their initial introduction to the genre had been through the pre-commercial Adventure. One informant, who joined the interactive fiction community late in the first decade of the 21st century, recounted how, as a child, he had 'watched [his] friend Shawn play Zork II, Zork III and Beyond Zork, over his shoulder' and 'watched [his] friend Kenny play Adventureland the same way, around the same time', discussing the games with his friends and suggesting solutions to the puzzles. Another 21st-century joiner wrote of having been 'introduced to IF at a very early age by playing Adventure on [his] grandpa's Apple'. Such recollections give a sense of the deep emotional significance that interactive fiction holds for those who value it, evoking a juncture between a stage in the individual's personal history and a moment in the history of technology. They embed the seminal works of the genre in a remembered past, not only of fond personal relationships, but also of now-obsolete computer hardware: the aforementioned 'Apple', for example, or the 'Kaypro computer' and 'TI Silent 700 paper terminal' on which two further informants recalled first experiencing Adventure. In these accounts, one can scarcely ignore a hint of nostalgia for the subjective magic of an earlier time. Indeed, one informant even stated that Adventure and the Infocom games 'made the computer seem magical in some way'. In a certain sense, then, the IF community at the time of data collection was defined by a past that it could not (and would not want to) transcend: as one well-regarded IF producer stated in interview, 'It's astonishing, going back to the Infocom works, how much was done right the first time'. In this, the IF community – like other retrogaming communities – appears to resemble those communities of online music fans that are focused on lost 'scenes' (see Bennett, 2002), and still more so, the geographically-dispersed adherents of formerly-popular genres of music that have entered what Lena and Peterson (2008) call a 'traditionalist' phase. Traditionalist musical genres provide parallels with retrogaming scenes such as IF, in that the aim of the communities that value them is 'to preserve a genre's … heritage and inculcate the rising generation of devotees in the … techniques, history, and rituals of the genre' (Lena and Peterson, 2008: 706). Producers of traditionalist genres also have much in common with artists and writers working in what Bourdieu called the 'field of restricted production', who – like musical traditionalists – aim to 'return to the sources' of their artforms even in their most radical gestures (Bourdieu, 1993c [1980]: 84). Like participants in the field of restricted production, traditionalist musicians tend to work less for money than for one another's approval (see Bourdieu, 1993a [1983]), so that distinctions between performers and audiences become blurred – both because audience members commonly perform on an amateur level and because even the star performers generally have to rely on other sources of income, such

that they too could be described as amateur (Lena and Peterson, 2008: 706). All of these characteristics of 'traditionalist' musical genres can be observed in the IF community, with its self-appointed task of building on Infocom's legacy through continued formal innovation within the parameters established by the original Adventure. Like the community that sustains each traditionalist musical genre, the IF community has 'clubs and associations devoted to the perpetuation of the genre' and organises 'contests and … annual … awards' with the aim of identifying and celebrating those works and creators that are 'deem[ed to] fit into the genre's emerging canon of exemplars' (Lena and Peterson, 2008: 706). And in this, too, it has developed tendencies analogous to those of the field of restricted production. The central institutions of the IF community, such as the Society for the Promotion of Adventure Games (established 1994) and the annual Interactive Fiction Competition and XYZZY Awards (inaugurated 1995 and 1996 respectively), are founded on a sincere and deeply-held commitment to the notion that good and bad IF games must be separated out from one another: a commitment with its mirror in 'the conviction that good and bad painting exist', which Bourdieu argued provided 'the stakes and the motor without which [the field of painting] could not function' (1993c [1980]: 80). Thus, while Van Dijk is right that 'most actors in the IF-network seem not very interested in "symbolic capital"' in the sense of 'status … in the literary field' (2014: 89), they are clearly very interested in the forms of status and symbolic capital operative within their own field.

The Investment of Capitals in Interactive Fiction

Bourdieu conceived success in the field of restricted production at least in part as a return on an investment of resources (see above). Success in the field of IF also appears to be determined at least partly by possession of certain resources. One such is the linguistic capital (Bourdieu, 1986) associated with high proficiency in written Standard English: works unavailable in that language are generally ignored by the IF community, while mistakes in English spelling, punctuation, and grammar are denigrated and quality of descriptive writing is praised. Another might be called 'development capital', by analogy with Consalvo's (2007) 'gaming capital'. Just as gaming capital refers to forms of knowledge and expertise that enable a gamer to build a reputation among other gamers (Consalvo, 2007: 18, 97, 184), development capital refers to forms of knowledge and expertise that enable a software developer to gain the esteem of his or her fellows. These could include both coding expertise and knowledge of the history of the field (including the current 'state of the art'). Developing a work of IF provides perhaps the premier means of displaying linguistic and development capital within the IF community, and evaluating a work of IF is arguably at least partly a matter of assessing the level of these capitals invested in it. Because IF is only exceptionally developed in teams, such resources must be possessed by the same individuals. The concept of development capital may help to make sense of the social meaning attached to a developer's choice of IF development system. Production of IF was, from the early 1990s until shortly after the time of quantitative data collection, dominated by four development systems. These were: TADS (Roberts, 1987), the earliest of the four; Inform (Nelson, 1993), the most frequently used; Hugo (Tessman, 1995), the least frequently used; and ADRIFT (Wild, 1999), which was the last to be released and is (as we shall see) something of a black sheep. Like Infocom's proprietary system, ZIL, each of the former three is a combination of (a) a domain-specific programming language (DSL) specifically designed for the creation of IF, and (b) a set of associated tools, minimally a compiler for turning human-readable source code into bytecode and a virtual machine to execute the bytecode, making the game playable.2 By contrast, ADRIFT is a point-and-click system and therefore is less flexible in

use but easier to learn. Both the lower flexibility and the lower initial investment of time and effort associated with ADRIFT can be interpreted negatively from the point of view of many in the IF community. For example, an ADRIFT-using informant who had done unusually well in the Interactive Fiction Competition suggested that enabling newcomers to turn their ideas rapidly into games while short-cutting the learning process and the debugging process was in fact a disadvantage of the system. He argued that ADRIFT made it too easy to release games without putting enough effort into ensuring that they were ready for other people to play, and criticised his ADRIFT-using peers for 'not play[ing] enough IF games, either ADRIFT or other formats' and 'tak[ing] no notice of what the rest of the IF community are up to and also what they expect'. It is here suggested that systems that require users to master a DSL, such as ZIL, Inform, TADS, and Hugo, are more highly regarded than those with point-and-click or menu-based interfaces, such as ADRIFT, the earlier The Quill (Yeandle, 1983), and the later Quest (Warren, 2000), because they both demand more development capital and (through the greater flexibility that they offer) provide greater opportunities for its display.3 Using them demonstrates commitment to doing things the way they are done in IF – which is to say, the way that Infocom developers did things: producing IF games by coding in a programming language with no other purpose, and taking responsibility for both creative and technical aspects of the process. The proposition that games produced using non-DSL systems were held in lower esteem receives support from examination of the Interactive Fiction Competition, in which submissions developed with systems not requiring mastery of a DSL fared poorly up until the time of data collection. Of a total of 465 entries from 2000 to 2012, only five were developed with Quest, just two of which did not finish in the bottom three for their respective years; 32 ADRIFT games were entered in the same period, with just three finishing higher than 10th place, and none in the top five. In a history of IF, a prominent community member asserts that ADRIFT is used by 'a largely separate community', with the 'consensus of the mainstream IF community … be[ing] that, while some interesting work has come out of the ADRIFT community, it is ultimately limited by the tool which it has chosen to embrace' (Maher, 2006: paragraph 66; in the same paragraph, ADRIFT is dismissed as technically 'no rival for the likes of Inform, TADS, and Hugo'). And this pattern is perpetuated in the limited scholarly literature on IF. For example, the sole academic monograph on the form features extensive discussion of Inform (Montfort, 2005: 26, 200–202, 204–205), slightly less extensive discussion of TADS (pp. 197–198, 221), and respectful mention of Hugo (p. 221), but only a dismissive mention of ADRIFT (p. 221), and nothing on Quest. An informant who had been using Inform since the early 1990s and had experimented with TADS said simply, 'when I see something better than "well, that's quite good for an ADRIFT game", maybe I'll start paying attention'. In the period following data collection, the IF community was transformed by an influx of developers and players associated with newer point-and-click development systems such as Twine (Klimas, 2009) and Undum (Millington, 2010), which produce text-based games whose mode of interaction is modelled on that of another once-popular form of commercially-produced culture originating in the 1970s, that is, the gamebook type exemplified by Bantam's Choose Your Own Adventure series (e.g. Packard, 1979). It can be observed that, while games in the CLI style produced using DSL-based systems dominated the Interactive Fiction Competition until 2012, games in the Choose Your Own Adventure (CYOA) style have achieved notable successes since then. Four of the top 10 highest-scoring games in the 2013 Interactive Fiction Competition were of the CYOA type (although none reached the top five); in the 2014 competition, just four CLI-style games placed in the top 10: three created with Inform, and one with the primarily non-DSL Quest system.4 This sea-change in the IF community is, however, outside the scope of the current article.

Quantitative Methodology

The site of data collection

Like the annual IF competitions (see above), the IFDB collects ratings and reviews, but, unlike them, it disaggregates ratings and publicly identifies them with specific individuals whose own creations can be identified with a single click: a feature whose importance is highlighted by the founder's statement that his 'main goal with the site was person-toperson recommendations rather than a community average', as this would help the user to seek out the opinions of 'reviewers you trust' (Roberts, 2007). This makes valuing relationships between game developers visible to the website user, as it is possible to navigate from a game to its developer, to a list of games the developer publicly values, to the games themselves and to their own developers. Importantly, the registered users of the IFDB appeared, by the time of data collection, to include the majority of currently-active IF developers. The site can thus be seen as one of several primary fora through which IF developers carry out a public dialogue on the good and bad in one another's work. By scraping all relevant available data from it, an overall picture of who valued whose work at a particular point in time could be constructed.

Data Collection and Processing

Data were collected from the IFDB in January 2012. Custom Python 2.7 programs were written to identify and download all IFDB pages pertaining to users, games, and ratings, and then to scrape data from those pages using regular expressions. Where errors arising from mis-entered or otherwise confusing data were identified, these were corrected in a local database (in particular: all works released prior to 1980 were undated or mis-dated; many records for early works listed the development system used to port the work as if it had been used to create it; some works were not linked to their developers' user profiles). User profiles did not include basic demographic information such as gender, ethnicity, or level of education, all of which have been found to have importance for the status and value of cultural producers and their work (see, respectively, Braden, 2009; Berkers, 2009; and Anheier et al., 1995: 890; De Nooy, 2008, in particular is a social network study that highlights the importance of gender and level of education in cultural valuing). To study the importance of these for IF might require survey research in addition to procedural data collection.

Analytic Methodology

Statistical analysis of figures for numbers of games in particular categories, numbers of ratings for those games, and so on, was used to establish general characteristics of behaviour on the website. A social network analytic approach was then applied. Social network analysis (see Scott, 2000) is a form of (usually) quantitative analysis in which entities are represented as nodes and relationships are represented as connections between nodes, with nodes and connections together referred to as a 'graph'. In an undirected graph, relationships are reciprocal, and connections are referred to as 'edges' and visualised as lines. In a directed graph, relationships are not necessarily reciprocal, and

connections are referred to as 'arcs' and visualised as arrows. Social network analysis involves relating structural properties of graphs, such as the existence or otherwise of cores, to characteristics of the relationships among the entities represented; here, the existence or otherwise of mutually-valuing peer groups. While there exist many definitions of 'core', this study employs Seidman's (1983) concept of the k-core. The k-core of an undirected graph, G, is the maximal sub-graph of G such that each node within the sub-graph has a minimum degree of k (i.e. that it is connected to at least k other nodes within the sub-graph). This concept is generally applied to undirected graphs (De Nooy et al., 2005: 71). When applying it to directed graphs, there are three possibilities: to specify that k is the minimum indegree (number of incoming arcs), the minimum outdegree (number of outgoing arcs), or the minimum combined indegree and outdegree of each node in the k-core. Where indegree alone is used, a node within the 1-core of a directed graph of positive evaluations by definition represents a person who has received a positive evaluation from at least one other person about whom the same can be said (and so on). This enables the analyst to identify mutually-valuing peer groups (see above). In constructing graphs from the data analysed here, a rating of four or five stars was modelled as an arc from a node representing the rater to a node representing the developer(s) of the rated game, except where the rater was also a developer of the same game.5

Quantitative Analysis

Games and Ratings on the IFDB

At the time of data collection, the IFDB contained entries for nearly 4000 games by nearly 2300 developers, just under a tenth of whom were registered users of the site. There were nearly 2900 user profiles, though many were inactive, with fewer than 850 members having posted ratings. These members had posted over 13,400 ratings, shared among roughly half the games on the site, with the remaining games receiving no ratings. Comparison of development systems proved interesting both in terms of number of games and number of ratings (see Table 1 and above). Of the nearly 4000 listed games, over 400 had been developed exclusively with the early post-commercial DSL-based system TADS, and about 3.5 times as many with the newer, and more popular, DSL system Inform. Nearly 300 had been developed with the point-and-click ADRIFT system, placing it closer to TADS than to the DSL-based Hugo in popularity (the latter having been used to develop fewer than 40 games). However, ADRIFT games were far more rarely rated (whether positively or negatively) than games developed with the DSL systems: there were 6.39 ratings per Inform game, 5.53 ratings per Hugo game, and 4.05 per TADS game, but only 1.35 per ADRIFT game. ZIL, the proprietary DSL used by developers working for the revered Infocom, accounted for few games, but these received a mean of 36.93 ratings each. Games developed using most other systems received very few ratings. Getting rated (whether positively or negatively) appeared, then, to be at least partly a matter of using either ZIL or a ZIL-like development system. With the exception of Infocom games, games predating the IF community were underrepresented. For example, while there would appear to have been over 500 games produced using 1980s non-DSL development system The Quill (see Van der Heide, 2012, for catalogue), well under half that many had been entered on the IFDB by the time of data collection. Moreover, where such games were entered, they were rarely rated. Following correction of the data, 1250 games appeared to have been released before 1995 (the year

of the first Interactive Fiction Competition), yet these received just 1.54 ratings per game, falling to 0.74 per game when Infocom games are excluded. More than twice as many games were recorded as released from 1995 onwards, and they received 4.55 ratings per game. For each year, Figure 2 shows the number of games released (the solid line) and the number of ratings received by those games (the dotted line): the latter falls below the former in the year of Infocom's demise, and rises back above it in the year of the launch of the Interactive Fiction Competition, reaching a peak in 2000 (note that the chart begins before the release of the first IF games because of the inclusion on the IFDB of a small number of non-IF computer programs considered to be predecessors of IF). Games unavailable in English were also under-represented and rarely rated, with, for example, just two Russian-language games being listed (one rated twice, the other unrated), despite the existence of a community writing and consuming Russian-language IF from the late 1980s onwards (see Minin, 2007). These patterns of exclusion reflect the IF community's interests and priorities, which centre around post-commercial games in English and games commercially published by Infocom (all of which were released only in English). A further feature of ratings on the site was their concentration on a small set of games that were both frequently rated and (on the whole) highly rated. Of the more than 700 games that received only a single rating, just 3% received the highest possible rating of five stars, while 27% received the lowest possible rating of one star. By contrast, the most frequently-rated work received nearly 150 five-star ratings versus a single one-star rating. Figure 3 is a scatterplot of total ratings against mean rating for each game. The greatest concentration of games is in the bottom left, with 38% of rated games receiving 17 or fewer ratings and a mean rating of one to two stars. (Note that many points are superimposed towards the lower end of the Y axis, because the lower Y is, the fewer values are mathematically possible for X.) No work with more than 50 ratings received a mean rating of less than 3.76 stars, suggesting that games do not receive widespread attention without a degree of consensus that they are relatively valuable, so that games that are publicly valued will tend to become more valued over time. One could see the handful of games plotted above the empty section of the chart as a sort of canon of frequently-rated, highly-rated works. Most received one or more XYZZY awards in their years of release (see above), several took first or second place in the Interactive Fiction Competition (ditto), and all those released before the inauguration of that event were published by Infocom. None was developed using a system other than Inform, TADS or ZIL. All were originally released in English. If this is the IF canon, its composition is as we would expect given the characteristics of the field described above: Infocom nostalgia, community institutions whose purpose is to identify new games worthy of the Infocom legacy, and a premium placed on linguistic capital and development capital.

The Network of Acts of Valuing

The graph representing the whole network of recognitions in the IFDB has over 2900 nodes and approaching 6700 arcs. Excluding disconnected nodes (to which we shall return below), there are altogether 15 completely separate components: 14 consist of dyads or triads representing a single non-developer's recognition of the work of one or two otherwise unrecognised developers (and nobody else), and the remaining massive component contains nearly 1250 nodes representing both developers and non-developers. This component is visualised in Figure 4, with its clear suggestion of a core–periphery structure. At the centre are nodes representing developers whose works have received high ratings from all parts of the component; around the rim are nodes representing IFDB users without highly-rated works; between the two are nodes representing developers whose works have received high ratings from relatively small numbers of database users mostly outside the core.

The great majority of arcs are directed inwards from the periphery to the core, obscuring any further hints of structure. Note that this graph does not include the hundreds of disconnected nodes representing individuals who neither gave nor received high ratings; these would otherwise appear as a cloud of dots. Nodes in Figure 4 are visually marked according to the development systems used by the agents represented (see Table 1 and above). A black node represents an agent who has not released any games (as far as we can tell from the IFDB). A white node labelled with a 'Z' represents an agent who has released at least one game that was developed using ZIL: that is, an agent at least some of whose work was published by Infocom. A plain white node represents an agent who has not released a game developed with ZIL, but who has released at least one game developed using one of the four post-commercial DSL-based or 'ZIL-like' development systems: Inform, TADS, Alan and Hugo. A grey node represents an agent who has not released any games developed using ZIL or a ZILlike system, but who has nonetheless released at least one game. Almost all nodes representing ZIL developers are found at or near the centre of the graph, where the nodes representing ZIL-like developers are concentrated, while nodes representing developers who did not use ZIL or a ZIL-like system (59% of which receive no more than a single incoming arc) are mostly found towards the periphery.

The 1-Core

The 1-core of the graph is a single connected component composed of just over 200 developers, of whom 45 have given high ratings and can be considered a mutually-valuing peer group. The remainder are developers valued non-reciprocally by members of that peer group and include a mixture of developers who were not active during the period between the founding of the IFDB and the collection of data (for example, the developers of classics such as Adventure, Adventureland and Zork I; see above) and developers who were active during that period but evaluated works on other websites or privately. There are no k-cores with higher values for k. The 1-core is visualised in Figure 5, with node colours and labels as in Figure 4. The small number of grey nodes (representing developers who used neither ZIL nor a ZIL-like development system) mostly receive only a single incoming arc and are consequently located on the outermost fringe of the graph. Interestingly, three receive arcs only from one or other of the two Inform-using developers present in the 1-core solely because they recognised one another's work (see the extreme right of the figure). ZIL-using developers for the most part receive multiple incoming arcs and are consequently to be found towards the densest part of the graph, where users of the major post-commercial DSL systems can be observed valuing one another's work. When we ignore website users who neither released games nor gave high ratings, the 1-remainder is composed of nearly 700 non-developers who gave high ratings, nearly 350 developers whose games had been rated highly but only by people also located within the 1-remainder, and over 1650 developers whose games received no high ratings at all, the vast majority of whom were totally disconnected from the rest of the network because they also gave no high ratings. Over 75% of all arcs in the graph lead from the 1-remainder to the 1-core, suggesting that games by developers whose games were rated highly by other highly-rated developers also tended to be rated highly by other IFDB users. Table 2 shows how completely the 1-core is dominated by developers primarily using Inform, with all other systems collectively accounting for less than a third of developers. But it also shows that a given Inform developer is not much more likely to appear in the 1-core than a given developer using either of the other two most popular post-commercial DSL systems: 14% of all TADS developers, 16% of all Hugo developers, and 17% of all Inform developers were found within the 1-core. Developers using the non-DSL ADRIFT

system are about half as well represented, proportionally to their overall numbers, and a clear majority of commercial-era developers whose works were developed with ZIL and therefore published by Infocom are found within the 1-core. As Table 3 shows, 99% of developers in the 1-core, but 87% of developers in the IFDB as a whole, released games in English, while the 13% of developers who released games only in other languages are virtually unrepresented in the 1-core. The over-representation within the 1-core of developers using DSL development systems to create games in the English language would appear to support the view that development capital and linguistic capital play a role in determining who may become part of the mutually-valuing peer group at the centre of the network of valuing.

Conclusion

This article argues that the IF field can best be understood as a 'retrogaming' or 'old school gaming' scene, questioning its identification as 'electronic literature' and thereby seeking to move IF research away from fundamentally unanswerable questions such as that of which 'figure' (i.e. metaphor) provides the most 'insights' into IF (Montfort, 2004: 316) and towards empirical questions, for example of how IF games are valued by the IF community. In its contention that IF and other retrogaming scenes are analogous to Lena and Peterson's traditionalist genres and its observation of similarities between such genres and Bourdieu's field of restricted production, this article also proffers a framework for answering that question, relating it to a general theory of how cultural value may continue to circulate in the absence of a viable market. Through quantitative analysis of ratings on a website extensively used by the IF community, the implied network of esteem relations is found to be characterised by advantageous positions for developers who produce games in English using domain-specific programming languages with no practical purpose beyond IF. On the basis of this finding and of qualitative analysis both of interviews and of documents produced within the IF community, it is proposed that two particular resources may facilitate entrance into the community's mutually-valuing peer group: linguistic capital and development capital. Thus, while Savage and Silva argue that the concept of field 'allows for an understanding of structural inequality processes in more effective ways than those [concepts] emerging from social network analysis or other "network" theories which seek to bypass these concerns altogether' (2013: 118), this article demonstrates the use of a form of social network analysis to study structural inequality processes within a field, potentially helping to advance understanding of the divisive politics behind contemporary debates on 'cultural value' (see Crossick and Kaszyńska, 2014). Linguistic capital is a familiar concept within the sociology of culture, while development capital is a new one that may have application beyond IF. Development capital as discussed here is specific to the IF field, but the term could be extended to cover the wider range of intangible resources treated as desirable in software development more generally. A striking feature of technically-oriented digital cultures is a willingness to share apparently valuable information, ideas, expertise, and even products without charge: one thinks not only of free games (such as those whose reception is studied here) and major open source projects (which are often sustained by a combination of remunerated and unremunerated labour) but of the vast numbers of programmer blogs, online tutorials, and free books (not to mention contributions to wikis and Q&A sites) that proliferate around technologies such as programming languages, libraries and software frameworks. Indeed, one of the key spokespeople of the open source movement has famously described it as a 'gift culture' in which participants compete for prestige (Raymond, 1999: chapter 3). Analysing computing more generally as a field with a specific form of capital to be accumulated, invested, displayed, and (somewhat

more straightforwardly than in the cultural field) converted into economic capital, may help us to make sense of the apparent contradiction between the utopian discourses that circulate within the information technology sector and the capitalist, even authoritarian, social structures that produced and that still sustain it. As Golumbia writes, '[r]ather than the community participation some evangelists advertise, computers and the web seem to bring out an especially strict and fierce individualistic competition' (2009: 184). This article suggests that such competition may occur not only at the level of the individual, nor even at that of the organisation, but also at the level of the group defined by commitment to a particular way of doing things – hence, perhaps, the emotional energy invested by programmers everywhere in questions of programming language, programming paradigm, and even choice of text editor. Both field theory and social network analysis would have much to contribute to the study of all this competition.

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Notes

1. See Bourdieu (1993a [1983]) on fields of cultural production. On the possibility and desirability of dialogue between field theory and social network analysis, see Anheier et al. (1995), De Nooy (2003) and Bottero and Crossley (2011).

2. Inform targets the virtual machine developed by Infocom, although this machine has since been expanded and improved and a (relatively little-used) alternative has been developed that overcomes some of its limitations.

3. Quest permits, but – crucially – does not require, programming alongside the use of its point-and-click interface. Moreover, the Quest DSL receives little emphasis in promotional materials for Quest (e.g. it is not mentioned in Warren, 2015), strengthening the impression that it is essentially a non-DSL development system with a DSL optionally available to advanced users. Use of Quest does not therefore suggest commitment to acquiring the form of IF-specific development capital associated with TADS, Inform, and Hugo.

4. Because the results of the Interactive Fiction Competition are determined by popular vote, changes in the composition of the set of people taking an interest in the competition can have a direct impact both upon the works entered and upon the relative success of particular entered works.

5. Following convention established on many other websites, such as YouTube, Amazon.com, and the Internet Movie Database, the IFDB enables its registered users to 'rate' games by awarding them between one and five stars, with three stars suggesting ambivalence and lower and higher numbers of stars suggesting negative and positive evaluations respectively. Visualisation was with PyGraphviz and layout with NetworkX's Fruchterman-Rheingold algorithm; Matplotlib was used for other charts.

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