

<https://www.eludamos.org>

Fancies Explained

Converting Symbolic Capital into NFTs

Alesha Serada

Eludamos: Journal for Computer Game Culture
Volume 14, issue 1, pp. 55–79

Fancies Explained

Converting Symbolic Capital into NFTs

ALESHA SERADA

Abstract

The concept of *symbolic capital*, introduced by Pierre Bourdieu (1986), has been applied to explain the circulation of value between game communities and the industry. The bottom-up approach can be found in the studies of so-called “gaming capital” accumulated by gamers (Consalvo, 2009), while the top-down approach focuses on the agents who hold the most power in the gaming industry (Nichols, 2013). These perspectives may require reconfiguration today: since the end of the 2010s, traditional power relations have been contested by ‘decentralized’ gaming that uses blockchain technologies and non-fungible tokens (NFTs). Their early adopters suggest that NFTs may disrupt traditional circulation of value to the benefit of players as opposed to major corporations. Many gamers, however, vehemently oppose NFTs in games. By combining these top-down and the bottom-up approaches, this article explains that the specific symbolic gaming capital remains systematically underappreciated in blockchain gaming, which operates along different vectors of power. To support my argument, I turn to the longest-running blockchain-based game *CryptoKitties* (Axiom Zen, 2017), and analyze the elements of the role-playing genre that appeared in the game during the collective process of continuous development. In the first case, these elements (“fancies”) were added by the developers of the game, and in the second case, an RPG-like extension emerged as one of its fan spin-offs (*KotoWars*). I conclude that symbolic capital is community-specific in the case of blockchain gaming. It is only available to those who already possess considerable symbolic, and, much more importantly, financial capital within the crypto community.

Keywords

Blockchain; NFTs; artificial scarcity; gaming communities; storytelling; failed games

In its most basic understanding, blockchain stands for a cryptographically protected, distributed ledger of all transactions in a software system. The most important feature of blockchain systems, in our case, is decentralization (see, e.g., Lapointe & Fishbane, 2019). There is no single controlling authority and nor is there a single point of failure, although social factors enable endless opportunities for

abusing security and trust in blockchain systems. Cryptocurrencies are the prime case to illustrate these tendencies. Their evolution has come a long way from the first cryptocurrency, Bitcoin, and Ethereum, the first major blockchain platform that runs on the second largest cryptocurrency, Ether, to multi-layered (over-)complicated platforms for decentralized finances, or DeFi. DeFi platforms can be used for high-risk investments and eventually for massive financial fraud, as the examples of Luna, Celsius (S. Lee, Lee, & Lee, 2022; Gechev, 2022; Tjahyana, 2022), and FTX have demonstrated recently. The topic of this article is 'decentralized' gaming realized on a blockchain in a rather similar way, although with much less detrimental consequences, safeguarded to some extent by their obvious playfulness.

According to da Silva and Omar, a *crypto game* is a "game that uses distributed ledgers to operate the game and a cryptocurrency for exchanging items or characters for money" (da Silva & Omar, 2021). I will further use the term *crypto games* to refer to the subfield of the video game industry that uses blockchain technologies and non-fungible tokens (NFTs) based on them. An NFT is a cryptographically secured, immutable token on a blockchain that includes a pointer to an external asset, e.g., a piece of digital art or a game asset. While the token is indeed immutable in most cases, the asset itself can be deleted or replaced, e.g., when a crypto game has discontinued partnership with a brand (Animoca Brands, 2022; Wilmoth, 2018). In a more positive scenario, the same token can be made interoperable across different games, where it points at different manifestations of the same asset, although actually realized examples have been rare so far (Dapper Labs, 2019).

Due to their decentralized management and potential interoperability, NFTs are often heralded as the future of gaming (Almohsen, Ghaidaa, & Alharthi, 2022; Arnedo-Moreno & Garcia-Font, 2022; Chen, 2020; Min et al., 2019; Pfeiffer, Kriglstein, & Wernbacher, 2020; da Silva & Omar, 2021). Their proponents envision potential interoperability of game assets and immutability of records of their ownership as the main benefits of the technology in its desired implementation. Decentralized ledgers may (or may not, see Ducuing, 2019; Low & Mik, 2020) transfer the rights to own and sell game assets in a decentralized metaverse from game companies to game players. Similar futures have appeared in research of virtual worlds before, e.g., in Edward Castronova's *Synthetic Worlds* (2005). The core features of blockchain-based games are decentralization and 'disintermediation', or removal of intermediaries from peer-to-peer transactions. These exact concepts have already been discussed as early as in 2004 (Hunter & Lastowka, 2004), painting a utopia of mass creation and consumption, where the hierarchical value chain of cultural production has been reorganized into a peer-to-peer network ('amateur-to-amateur'), similar to decentralized architecture of today's crypto games.

Converting gaming skills and knowledge into financial profit is not an entirely alien idea for game researchers. Castronova and like-minded economists had long hoped that the invisible hand of the market would bring equilibrium to decentralized digital economic systems (Hunter & Lastowka, 2004); everybody would be able to live a

satisfying virtual life and even earn their living by playing games online (Castronova, 2008, 2020). This utopia is often uncritically reproduced in the ideology of blockchain-based games: they are advertised as 'play-to-earn' opportunities that give agency and power back to players (Axie Infinity 2020; Blockade Games 2022; DA-COCO 2021). Many gamers, however, vehemently oppose NFTs in games, and the play-to-earn ethic of crypto games seems to be the primary source of discontent. Typical crypto games normalize the pay-to-win tendency that goes against gamers' understanding of fairness (see, e.g., Consalvo, 2009).

The positive effects of blockchain-based gaming at the grassroots level are yet to be seen. Existing empirical research into crypto games reveals speculative behaviors (J. Lee, Yoo, & Jang, 2019), prevalence of gambling mechanics (Scholten et al., 2019) and systemic unfairness (Sako, Matsuo, & Meier, 2021). The promises of ownership and control in such games also appear to be deceptive (Ducuing, 2019). As for now, academically speaking, the value of blockchain and NFTs in games is mostly discussed in relation to financial value (da Silva & Omar 2021, p. 870). It is true that new blockchain-based models such as initial coin offering (ICO) allow people to crowdsource the funds for independent game development and even make a profit on the game before it is even made. After that, however, the actual game may never materialize; the *Cryptozoo* project by the major YouTube celebrity Logan Paul makes the most infamous example among many (Coffeezilla, 2022). This normalization of deception and fraud in both small- and large-scale blockchain-based game development (or absence thereof) points at the shift in values of both developers and players, and to the change of power balance that is different from the initially proposed self-sovereign crypto utopia.

Early adopters of blockchain technologies suggest that NFTs may disrupt the traditional circulation of value to the benefit of players as opposed to major corporations. In the meantime, some of the biggest game corporations are embracing NFTs with the intention to fortify existing power relations in the industry. Although many game publishers and platforms such as Steam have distanced themselves from blockchain projects due to financial and reputational risks, other major companies such as Square Enix have already embraced NFTs in games. What is new, at least according to such documents as the infamous open letter from the president of Square Enix (Matsuda, 2022, 2023), is that gaming skills and experience are presented not as valuable and meaningful in themselves, but as means to an end, namely obtaining financial value. This goes against mainstream gamer ethics, according to which so-called gaming capital—specialized skills and deep knowledge of games—cannot be bought for real-world money (Consalvo, 2009).

In addition to economic observations, production studies of video games have to follow both the global and national distribution of capital and power. In the industrial context, "every video game becomes not just a site of play, but also a site of struggle over power and profit, one hidden under the guise of play" (Nichols, 2013, p. 31). This approach is important in multiplayer games in general, such as RPGs,

which exist in a continuous state of (co-)production labeled 'games-as-a-service' (Zagal & Björk, 2018, 326). When continuous game production becomes directly profit-driven, it eventually starts churning out "games-as-a-disservice" (Lehtonen, Vesa, & Harviainen, 2022), which are games that do not have value for the player. Blockchain-based games may follow the same trend, unless they offer legitimate means of value co-creation, in which financial capital is not the end goal. In order to go beyond the financial value, I will turn to the notions of cultural and symbolic capital in society and in game production in particular, so we can see how exactly blockchain technologies and NFTs disrupt value creation in the field of video gaming.

Key concepts: Cultural, symbolic and financial capital in the game industry

The concepts of *social*, *cultural* and *symbolic capital* in sociological terms first appeared in works of the French sociologist Pierre Bourdieu. Different types of financial and cultural capital can be exchanged at dynamic 'rates' and transform into more sophisticated forms, such as particular forms of specific symbolic capital that Bourdieu described in his later works. The canonical understanding of *cultural capital* can be found in *Distinction: A Social Critique of the Judgement of Taste* (Bourdieu, 1987), which was first published in French in 1979. It refers to one particular "set of actually usable resources and powers" (1987, p. 117) in society that is acquired through education. In a later lecture from 1983, Bourdieu explains that cultural capital "as legitimate competence, as authority exerting an effect of (mis)recognition" (1986, p. 245) is naturalized as symbolic capital, which is specific to a particular field in society. One important function of symbolic capital is to obfuscate factual power relations that are based, first and foremost, on uneven distribution of financial capital, which is often inherited. It remains an open question whether cryptocurrencies can disrupt the existing financial system, or whether they should be treated as a very particular form of symbolic capital. Games, however, provide us with a much clearer example of cultural capital that is naturalized as symbolic in the form of game achievements, skills and knowledge.

Bourdieu's theories have been used in game studies in two ways that I will describe as the *bottom-up* and *top-down* approaches. The bottom-up approach can be found in the studies of so-called gaming capital accumulated by gamers, as conceptualized by Mia Consalvo. In short, "possessing gaming capital is supposed to be about game players' superior playing abilities and knowledge about games" (Consalvo, 2009, p. 38). At the same time, the top-down approach to symbolic capital in games focuses on the agents who hold the most power in the gaming industry. From this perspective, Randy Nichols has applied Bourdieu's concepts in the area of game production studies to demonstrate how major game producers secure a dominant position in the field with economic (financial) capital (Nichols, 2013).

These two approaches can be combined in order to see the circulation of different forms of capital. For example, Consalvo also demonstrates commodification of gaming capital and selling it back to gamers, e.g., in paratexts created by the industry. In this case, gaming capital can be indirectly obtained via financial capital. More importantly, the gaming industry can decide and influence who holds the kind of gaming capital that is considered most valuable (Nichols, 2013, p. 32) (e.g., young middle class white men, because they have more money and time to spend on video games; see (Paul, 2018)). This example demonstrates the importance of mapping the flow of symbolic capital in order to explain particular cultures.

Building on Bourdieu, Nichols presents the map of video game production that shows all actors and the forms of capital that they possess (Figure 1). We can see that commercial game production in big studios has access to major financial (economic) capital (CE+), but their production is considered ‘low culture’, which signifies low symbolic (specific) capital. In comparison, small-scale game developers, e.g., ‘indie developers’, have a high degree of gaming capital (their games are considered a form of art), but low financial capital, because they do not always have access to resources in global game production (see, e.g., Pérez Latorre, 2016 for a Bourdieusian analysis of indie games).

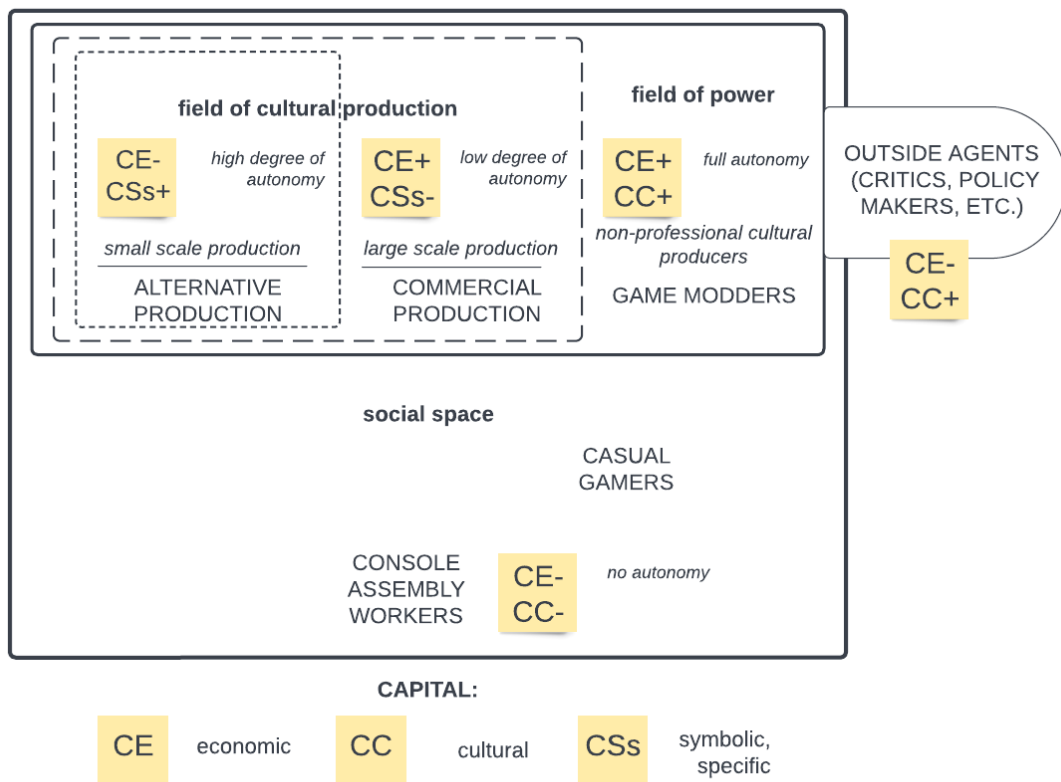


Figure 1. The field of video game cultural production, recreated from Nichols (2013) in Lucidchart.

One useful way to read this map in the context of our study is to pay attention to relations between economic (financial) capital (CE) and symbolic (specific) capital (CSs). Nichols describes symbolic capital as specific to a particular field, which is, in our case, gaming. As both Nichols and Consalvo use Bourdieu as the source, it is safe to say that specific/symbolic capital in Nichols's scheme is, in most cases the same as gaming capital in Consalvo's work: both researchers describe a set of resources, powers, knowledge and skills obtained in the field of gaming (the bottom-up approach), which game companies eventually learn to exploit in their favor (the top-down approach). We should also keep the dynamic development of the field in mind: Nichols' map comes from the early 2010s when game modders were gradually acquiring more power in the field—think about the late success of *Counter-Strike: Source* (Valve & Turtle Rock Studios, 2004), a mod of *Half-Life* (Valve, 1998) that was followed by the still internationally successful *Counter-Strike: Global Offensive* (Valve & Hidden Path Entertainment, 2012) (see Joseph, 2018). Valve later tried unsuccessfully to capitalize on mods and other user-created content in 2015 (Joseph, 2018). In a similar way, 'indie' game developers have found themselves in a tension between economic and symbolic capital (Pérez Latorre, 2016). In other words, the gaming community used to present many opportunities for game enthusiasts to convert their gaming capital into financial capital, as Figure 1 presents. But these opportunities would diminish later, with the aggressive capitalization of the gaming industry; in fact, crypto games are making a direct call back to these times in their 'play-to-earn' philosophy.

Relations between financial and symbolic (gaming) capital become even more interesting when we use the same map to show the landscape of blockchain gaming (Figure 2). One important difference is that the central space in the cultural production of blockchain-based games is now dominated by small-scale studios with a high degree of autonomy. This is illustrative of the hope that that application of blockchain in games could, at least in theory, disrupt the current power relations in the games industry. This scheme largely corresponds to the declarative purpose of leveling the cultural field and empowering gamers in their resistance against greedy corporations. As of 2022, there have been no major blockchain games comparable to AAA games in terms of complexity and creativity (the infamous *CryptoZoo* consumed as much money as a AAA production, but no actual game came out of it (Coffeezilla, 2022)). However, these small studios also have access to almost endless financial capital from the crypto field. At the same time, their symbolic (gaming) capital seems to be diminishing in inverse proportion to financial capital. The crypto games that they produce are rarely enjoyable or even playable as for now, and outside agents (critics and policy makers) always point to this in their cultural critique. These agents, however, hold no power in the blockchain social space.

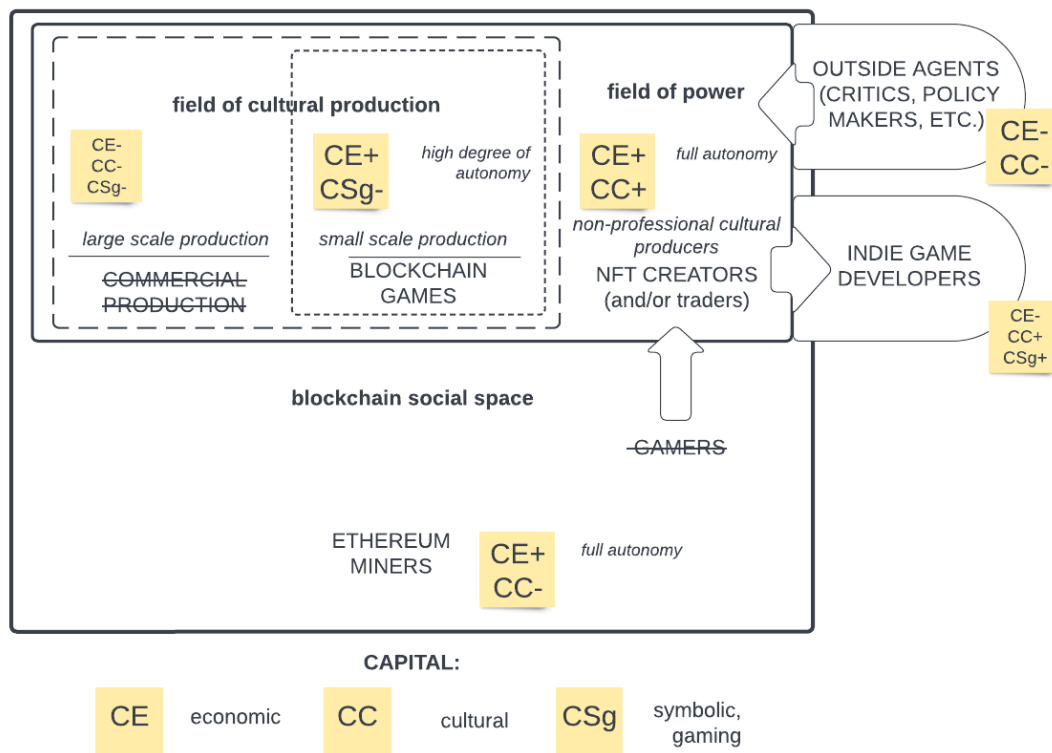


Figure 2. The field of blockchain game cultural production, based on Nichols (2013) in Lucidchart.

Let us take a look at the margins of the crypto game production field. Some indie game developers cooperate with the blockchain community, but their participation is rarely productive, for reasons that will be explained later in this article. Gamers, as a community, despise blockchain gaming and leave the field altogether. However, some non-professional creators find success creating and trading NFTs, sometimes game-related. Finally, ‘miners’ who calculate block hashes to keep the blockchain part of games going have been a considerable power, and could even influence how these games were run (Calvão, 2019; Kraft, 2019; Strehle & Ante, 2020)—at least, until the recent crypto crash. This is drastically different from Nichols’ map, where assembly workers and other suppliers of basic gaming infrastructure have no power over the corresponding cultural field. Another question is whether this has any positive influence on the gaming aspect, as neither miners nor assembly workers apply any gaming-related skills and knowledge in their work.

This leads us to a contradiction: high gaming capital never coincides with high financial capital in this particular field of crypto games. As mentioned earlier, dedicated gamers tend to despise crypto games, and, as we will see below, indie game developers with any considerable gaming capital have no influence in the field of blockchain-based gaming. This poses the question: is it possible to exchange traditional gaming capital for other forms of value in the production of blockchain-based

games? Will the 'conversion rate' be favorable to those who know more about gaming, or who play or make better games? We will return to these questions in the conclusion.

To prepare the groundwork for further argumentation, I will examine one of the first and the longest-living blockchain-based games, *CryptoKitties* (Axiom Zen, 2017), and focus in particular on two cases when the elements of the role-playing game (RPG) genre were added to the game in the process of its continuous development. Correspondingly, these two cases represent the top-down and the bottom-up approaches to communal creation of value in game production. The RPG elements were chosen firstly because they were the first to be brought up by the community of players, and secondly because of the important role of role-playing in the history of video gaming in general. I evaluated the circulation of symbolic (gaming) and financial capital in these two cases, based on the market data openly available in the game, in free analytical services such as CoinGecko (CoinGecko, 2021), and custom informational resources created by players and fans of the game, such as Kitty Explorer (KittyExplorer, 2021) and KotoBaza (KotoBaza, 2022b). I started with the role and the meaning of 'fancy' tokens in the game's inventory, by applying the analytical framework of Dutton and Consalvo (2006). Dutton and Consalvo suggest that a systematic catalogue of particular objects in a game can reveal themes and patterns to be approached with critical analysis. Based on open data from the game, I created my own annotated catalogue that is available on the external data service (Serada, 2023a) and assessed its appeal to forms of value other than financial. Case 1 evaluates the effectiveness of this appeal to players who are expected to contribute to the value of the game, and Case 2 measures involvement from the game enthusiasts who actually contributed to its further development. It appeared that circulation of financial capital was still the main driving force, and no form of gaming capital was valuable enough to change the course of its continuous development.

Case 1: The top-down approach: Value created by developers

According to Bourdieu, the structure of social space is defined by the overall volume and structure of capital in possession of various social agents (for instance, as depicted in Figure 1 and Figure 2). For this reason, this structure can be mapped as "the distribution of the various species of capital that function both as instruments and stakes of struggle in the different fields" (Bourdieu, 2018, p. 109). Therefore, the understanding of the overall structure of blockchain gaming as a social phenomenon can be gained by paying attention to different types of social agents (in our case, gamers, game producers and modders), and tracing various types of economic and social capital that they exchange. In the first case, producers of blockchain games have tried to create gaming-specific symbolic capital to capitalize on gamers. Let us see what kind of value and capital has been created, and how.

Artificial scarcity and the value of ‘fancies’

CryptoKitties (Axiom Zen, 2017) is the first casual blockchain-based game and the most used application of the biggest blockchain platform Ethereum outside of decentralized finances and gambling (see Scholten et al., 2019) in the first three years of its existence. Its genre can be described as a monster breeding simulator (Serada, forthcoming) with collectable tokens that offers a very limited number of game mechanics. Breeding and trading are the two main ways to derive enjoyment from the game: speculation and gambling (Scholten et al., 2019; Serada, 2020). Both of these activities streamline circulation of financial capital with very little attention to symbolic or cultural value attached to the tokens. To construct economic value, the virtual economy of the game uses artificial scarcity (CryptoKitties, 2018a)—this principle of virtual economies is the basis of many online multiplayer RPGs. The value of virtual items is constructed in inverse proportion to their quantity, and rarer items are ‘naturally’ more desirable and expensive in a society. However, the price of products is also greatly influenced by their cultural and symbolic value, which becomes even more obvious on virtual markets of immaterial goods such as NFTs.

The decentralized architecture of the game suggests that players have full control over its economy, as the market of game NFTs is shaped by peer-to-peer trade. Predictably, same as in virtual economies described before (Lehdonvirta & Castronova, 2014, p. 45), players of *CryptoKitties* quickly figured out how to exploit artificial scarcity and turned it into abundance (Serada, Sihvonen, & Harviainen, 2021) by producing ‘rare’ and ‘unique kitties’ in quantities that greatly overwhelmed demand. To retain at least some form of control over the allegedly decentralized game, and also to appeal to broader cultural tastes of players, the developers started to introduce more, different valuable ‘scarcities’ in the form of so-called ‘fancy’ tokens. Unlike most *CryptoKitties*, ‘fancies’ have unique ‘hand-made’ art created by anonymous artists hired by the owners of the game. Online catalogues of fancy tokens can be found on the official website of the game (CryptoKitties, 2022), as well as on fan websites (KotoBaza, 2022a), and the full inventory used for this research is published on ResearchGate in the form of the annotated list of tokens (Serada, 2023a). Particular fancies are henceforth referred to by numbers according to the annotated list of tokens (Serada, 2023a), which also corresponds to the order of their introduction.

112 fancy types have been introduced during the first four years of the game’s existence, and the first year was rather successful in terms of engagement and generating financial capital for the game’s owners and the wealthiest players (see Serada, 2021). Fancies can only be obtained in a paid game of chance with rather low probabilities, sometimes within a very short time window or in a limited quantity. This makes them relatively expensive and, in some cases, actually rare, so the most experienced investors could actually convert them into financial capital (Serada, forthcoming).

Some of the fancies are standalone collectibles with unique artworks, while others follow popular tropes of mass culture (cyberpunk, zombie invasion, medieval fantasy, space invaders, pirates, etc.), which are often used in the worldbuilding of video games. The analysis of the inventory reveals several prominent themes: medieval fantasy (15 fancies), science and technology (16), the pirate-adjacent marine theme (10), music (9), and ninjas (6). There were also very distinct limited collections of meditating chameleons (3), winter leisure (3), western (4) and the pillow fight (3). The rest of the tokens appeared harder to categorize, although some of them were somewhat related to larger themes, such as cute alpacas also looked like they could be in an indie band (the music theme), and two zombie fancies could be grouped with the Halloween collection. As is common in marketing in general, 17 tokens out of 112 are seasonal offerings: four unique fancies were issued around Christmas and New Year's Eve, four commemorated Halloween, three were for St. Valentine's Day, and one for St. Patrick's day. Three different fancies were issued during the Chinese New Year in an attempt to conquer the Chinese market (which did not yield any noticeable results).

The inventory shows a clear indication that the publishers of the game had hoped to exchange their symbolic capital in the crypto industry for cultural capital in other fields. To start, the music-themed NFTs may have been motivated by their only successful partnership with a brand outside of the crypto sphere, represented by the British rock band Muse (Muse, 2020). This partnership inspired the music fancy Mibbles (#102).¹ In total, six fancy tokens were produced in partnerships with other companies, creators and individual celebrities, although one of these partnerships, with the NBA superstar Stephen Curry, was cancelled (Wilmoth, 2018) (he later issued his own NFTs). In this light, sport-themed (#29 – Boot; #47 – Squib) and even food-themed fancies (see #31 – Catbury) may have functioned as 'white label' NFTs, as proofs of concept for such partnerships.

Coming back to Dutton and Consalvo's critical analysis of inventories, we can still see the positive side of fancies in terms of societal value. The fancy PussForProgress (#17) was issued on International Women's Day in 2018, and the Pride month of the same year was commemorated with Kittypride (#27) fancy. The same political stance was expressed in three tokens dedicated to significant, even if less-known, female figures in the blockchain entrepreneurship space: Sheila Warren (#38), Jutta Steiner (#34) and Neha Narula (#44). A noticeable number of fancy characters are distinctly female: the figure skater YuriCatsuki (#12), the DJ DjMeowlody (#64), the witches Furmione (#70) and Felis (#82), the archer Gwendolion (#74), and the rock musicians Janis (#95) and Joan (#99), apparently inspired by Janis Joplin and Joan Jett. At least

¹ Later in 2021, the creators of the NFT collection 'Bored Apes Yacht Club' were able to catch the attention of major music stars and generated immense financial capital by partnering with such artists as Eminem and Snoop Dogg (Popper, 2021).

three of the ‘ninja kitties’ are also female. Based on that, at least, in terms of representation, *CryptoKitties* has done much better than mainstream video games.

We may ask whether the value of fancies still followed the principle of artificial scarcity, and whether their rarity directly translated into economic value. With 112 types of tokens whose quantity ranges from 72 to 10,000 units in the game, we would reasonably expect at least some noticeable correlation between rarity and price. To answer this question, the open market data was collected from the official catalogue of fancies on 21 June 2022, soon after this feature was implemented in the game for the first time after three years (CryptoKitties, 2022). The results are presented in Figure 3.

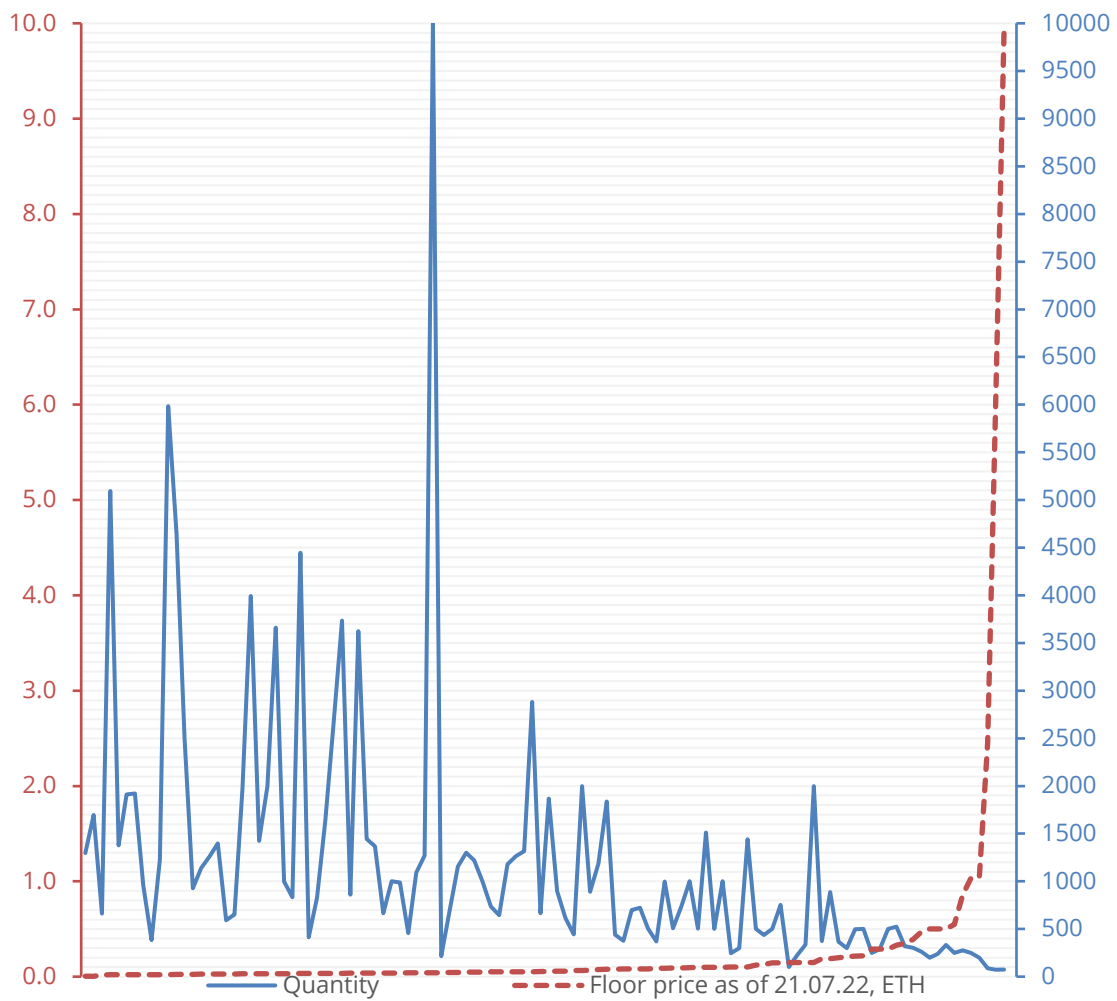


Figure 3. Effects of artificial scarcity on the price of fancy tokens. This graph shows relations between two series of values, not their actual proportions. The left vertical axis corresponds to the floor price of 112 fancy tokens in ETH. The right vertical axis corresponds to the quantity of each of the tokens, sorted from least to most numerous on the horizontal axis. The graph demonstrates that a visible correlation between the quantity and the price of a fancy token only matters for the rarest game NFTs that exist in quantities of less than 300 tokens.

A negative correlation between quantity and price of tokens of -0.169 was indeed observed, but this is insignificant. Mapping the data has revealed that scarcity only mattered for the tokens whose quantity in the game was around 300 or less. These tokens were significantly more expensive. According to KittyHelper.co (KittyHelper, 2022), the game has had about 4–5,000 active monthly players for most of the time of its existence, and the supply of 300 or less tokens would leave them reasonably desirable. Moreover, the rather chaotic pricing of not-particularly-rare fancies shows that there were other factors in their valuation, which could be aesthetic, historical, determined by the game culture, or any combination thereof. Eventually, the introduction of new fancies significantly increased player activity in 2018 (Figure 4). However, this effect became less visible in the following years as the number of active players diminished.

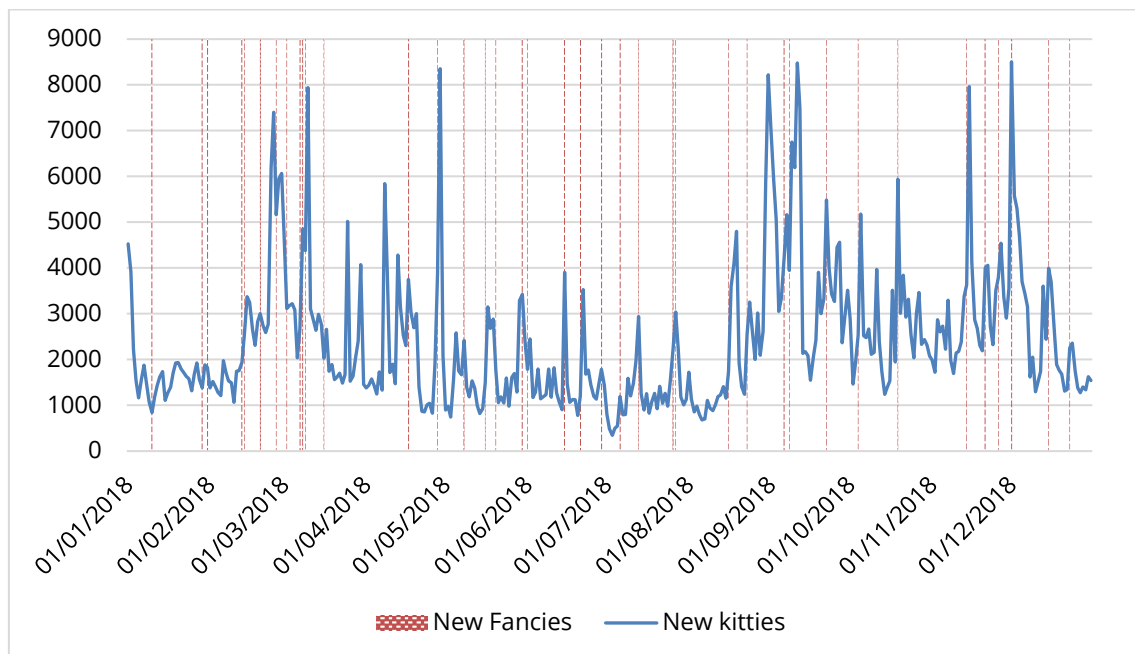


Figure 4. The total number of new tokens in the game (blue line) per day often coincided with the introduction of new fancies (orange ticks). This data shows the period of time in 2018 when this correlation was particularly noticeable. The data about newly bred kitties per day was obtained from Kitty Explorer (KittyExplorer, 2021), and the timeline for new fancies was obtained from KotoBaza (KotoBaza, 2022c).

We can clearly observe certain attempts to assign cultural value to the tokens by designing them along the familiar tropes of fantastic worldbuilding. By referring to the themes of fantasy, marine adventure, and zombie invasion, the inventory of fancies seems to afford playful practices that are not instrumental in ‘playing-to-earn’ and more similar to traditional video games, such as role-playing in fictional worlds along their typical narratives. This appeals to specific symbolic and gaming capital, and in the following section we will ask whether this symbolic capital was valuable enough within the community of crypto game players.

Let's not go to Catelot: Negotiating value exchange

Following the promises of decentralization and empowerment, the developers engaged in active formal and informal communication with players on Twitter and Discord. Announcements of new fancies were communicated in the company's social media and further explained in blog posts. Throughout the first three years, new themes and original characters were introduced in a seemingly unsystematic manner and described in a deliberately informal style, as if the developers of the game were writing fanfiction about their own creation. On the other hand, the tone of writing encouraged community participation in value co-creation, in accordance with the 'power to the players' agenda. Another way to see player input is in such cases to treat it as more "opportunities for exploitation and appropriation by industrial interests" (Nichols, 2013, p. 43): if game fans fill in gaps in the non-existent narrative of the game themselves, its owners do not need to invest even a small fraction of their generous venture capital funding into work of professional game writers.

Drawing from corporate communication, three different but likely interconnected fictional worlds were introduced in the official *CryptoKitties* blog: the steampunk world of Kittenheim that also touches the marine theme, the ninja-themed Obsidian Syndicate and the medieval fantasy world of Catelot. These fictional worlds were only briefly mentioned in blog posts and never developed into coherent, fleshed-out stories. Neither were they supported by any story-specific rules or interactive elements in the game itself. The story of Catelot was the most developed: it was first mentioned in the corporate blog on 9 November 2018, when a set of three dragon fancies (#41 – Dreggo, #42 – DracoJunior, #44 – Draco) was introduced to be released in November 2018. First, the fancy Draco was introduced. It is a cat that looks like a dragon, and its amount has been limited to 1,155 tokens. It was accompanied by Draco Junior, only 1,398 of which had been bred in the same year, and Dreggo, which was the easiest to breed and amounted to 3,624 tokens. All these fancies could only be bred in a limited period of time, and they still remain relatively valuable, as their floor price suggests, although still not exactly aligned with the principle of artificial scarcity (see the data: Serada, 2023b).

In the initial version of the Catelot's story, according to Dapper Labs, "a band of heroic Kitties—a brave knight, powerful wizard, and faithful squire—joined forces to battle a fearsome dragon cat that terrorized the kingdom of Catelot" (CryptoKitties, 2018c). The dragon was subdued in a non-violent pillow fight—a detail that was reused in the latest (at the time of writing) fancy collection in 2022 when probably no active players would remember where it came from. Several knights and wizard characters appeared in the game much later, although the squire was already in the game, he just hadn't been mentioned at that time. The first truly medieval fantasy fancy, Page (#25), has been in the game since June 2018, but did not receive much character development for a year (CryptoKitties, 2019a). Most of the time, this fancy has been the easiest and the cheapest to obtain.

The second fancy in the same style as the Page was released in September 2019 (and it would be fair to say that everybody had forgotten about Draco at that time, after 11 months of not developing his story). Again, the official announcement hinted at the existence of the larger fictional world of Catelot, probably with new quests, challenges and other experiences that would not be just gambling and speculation.

Weeks ago Page, our fearless furry squire, blew into the great horn of Catelot, releasing a great meow that rang throughout the KittyVerse and called all the greatest warriors to assemble. (CryptoKitties, 2019b)

This new character was called Pawderick the Lancer, and the promotional post did not tell much about him, apart from the urgent call to “breed, breed, breed” this “simple Fancy” (CryptoKitties, 2019b), thus engaging into a rather expensive game of chance. After a week, the next character Purrzival was introduced in the same manner, without any explanation for his story, but, of course, with the amplified encouragement to “breed”. Catseye, Gwendolion and Bartholomeow followed in November, with even less explanation beyond discussions on Discord. This was even more disappointing, as the art of these new characters was exceptionally good, especially in comparison to randomly generated non-fancy CryptoKitties.

So far, the promotional materials have played along the tropes of a role-playing game: a party of diverse characters armored with different skills and weapons gathers to embark on a quest, represented by yet another dragon character Shoopadoop. Shoopadoop, a dragon ‘fancy’, was released on 23 November; his appearance is very similar to Draco, but he was presented as a part of the Catelot story. The amount of creative work that went into drawing new characters was obvious; still, it was wasted on the gambling mechanics. There was no actual new gaming content. On the contrary, the whole game was going into a period of stagnation. The price of Ether skyrocketed in the following 2020, while the Ethereum network got clogged, because the Ethereum 1.0 platform, by its design, did not scale to the standards of mass adoption. As of June 2022, all Catelot fancies—Page, Pawderick, Purrzival, Catseye, Gwendolion and Bartholomeow—remained breedable, and available on the second-hand market for decent but affordable, by community standards, floor prices. Notably, artificial scarcity is still of very little use to explain the floor prices (see the data: Serada, 2023b).

It should be noted that the community has always appreciated fancies—it is just that there was not much to do with them, as the development of the story was pushed on the players themselves. Eventually, it may be that the creative direction that has led the owners of the game to Catelot has, in fact, been lifted from the game’s most devoted fans: the design of the first ‘kitty’ that looked like a character from the Catelot game world was based on the drawing of the wife of one of the moderators of the game’s social media (CryptoKitties, 2018b). This is one way to make profit of fan engagement by appropriating the creative work of fans for free and then capitalizing

on that (Nichols, 2013). Their cultural capital is indeed converted into financial capital, but only for the game publishers. In our case, medieval fantasy cat warriors and monsters could potentially become valuable to gamers in particular, if the game employed these NFTs in any meaningful manner—too bad that never happened, and the value of these tokens was still driven by gambling and speculation, as usual.

Case 2: The bottom-up approach: Outsourcing game development to players in *KotoWars*

The cultural field of blockchain gaming is different from video gaming in terms of structure. The community of blockchain adopters relies on its own specific forms of capital, such as the one embodied in fungible and non-fungible tokens on blockchain, and the value of these tokens seems to matter only to the gamers who are also 'crypto enthusiasts'. We should not, however, see this field as strictly hierarchical and always adherent to the rule of 'cryptocapital'. To the contrary, relations of power in blockchain gaming are distributed between many smaller actors, e.g., small publishers and individual traders, rather than centered around a few major corporations, as is the case in AAA video game production. These smaller social agents can influence the market in direct and indirect ways. Our second case constitutes the longest-living and the most consistent attempt to introduce gaming-specific capital into the blockchain field from the ground up. Still, individual players and modders did not possess enough social capital to make a permanent impact on the market: as Bourdieu writes in *Distinction*, "choices always owe part of their value to the value of the chooser" (1987, p. 91).

The unpaid creative labor of game enthusiasts has been encouraged in *CryptoKitties* from early on. If successful, that would mean that gaming knowledge and skills on the players' side (their gaming capital, in our terms) would translate into financial capital on the publishers' side, without the need for them to spend on actual game development. There have been moderately successful examples, which include the racing game of luck *KittyRace* (Min et al., 2019), and, more importantly to us, the simple card battler *KotoWars*. The latter was developed by a group of fan-developers and 'kitty' traders who also ran the community service *Kotobaza*. The owners of *CryptoKitties* were pleased to cooperate, while at the same time acknowledging that there was very little to *CryptoKitties* itself at that time apart from the breeding game of chance.

If you're looking for a way to engage with your Kitties outside of breeding mechanics, *Kotowars* is the game for you. (CryptoKitties, 2018c)

Indeed, the purpose of *KotoWars* was to assign a new type of value to some of the abundant valueless tokens that resulted from unsuccessful or simply not well thought-off breeding.

With high-generation cats being cheaper than breeding cost it allows users build decks [sic] they desire at minimum cost. (KotoWars, 2019b)

The high amount of gaming capital presupposes expert knowledge about particular game genres, such as RPGs, which was obvious from *KotoWars*' initial vision. In this modification, built on top of the existing game, the attributes of tokens are treated not in terms of artificial scarcity (as initially designed), but in the same way as attributes in RPGs: "basic and more or less stable aspects of agents that affect what they can do" (Zagal & Björk, 2018, p. 328). As in RPGs, these repurposed characters now have functional roles and privileged abilities "that are only available to specific types of agents: e.g. only the 'mage' can cast spells, only the thief can pick pockets" (Zagal & Björk, 2018, p. 328). To achieve ongoing playability and afford meaningful actions, the *KotoWars* team approached the existing *CryptoKitties* tokens as a set of playing cards whose attributes could be repurposed as 'the stats' in a card game (Figure 5).

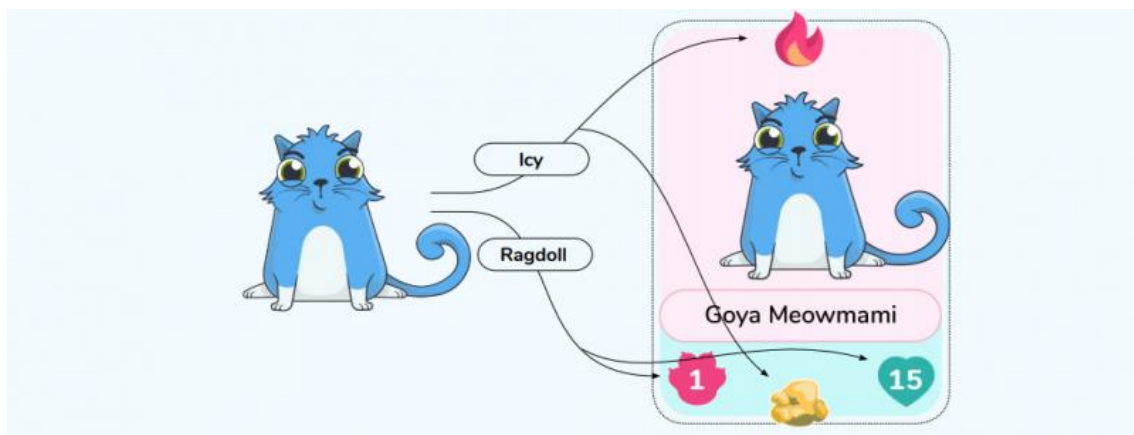


Figure 5. How *KotoWars* remaps attributes of *CryptoKitties* into game stats in a card game (KotoWars, 2019b).

The playable prototype of the game would use a deck of 33 cards: 32 typical kitties and the Champion, who represents the player (KotoWars, 2019b). The attribute of fur color would define attack and defense parameters of the token-based card, and the attribute of accent color would determine to which of four elements the card would belong. Fire would beat air, air would beat earth, earth would beat water, and water, again, fire, in a typical rock-paper-scissors mechanic. This would allow for enough combinations to design PvP battles between players who owned different stacks of cards, which means different collections of *CryptoKitties* tokens. This approach felt more professional than the lackluster treatment of game characters and story lines by extremely well-funded publishers of *CryptoKitties*: in fact, *KotoWars* had a professional game designer on the team (CryptoKitties, 2018c). The absence thereof in *CryptoKitties* indicates that the existing gaming capital (such as gaming knowledge, skills, and achievements) was not valued in this particular blockchain community.

Still, even this considerable amount of effort put into creation of an actually playable game did not result in surplus value of any kind. The beginning seemed rather positive. The alpha version of the game was tested in competitive play throughout 2019. Players would use their cards against the ‘fancy’ zombie Stitches and earn points for dealing more damage (KotoWars, 2019a). Most active *CryptoKitties* players gladly engaged into this new activity: there had been over 40 collective player sessions throughout 2019, with considerable prize pools that consisted of more fancy tokens, fungible ‘Wrapped CryptoKitties’ tokens that could be traded on some exchanges, and even *KotoWars*’ own blockchain-based ERC-20 tokens, *Kotowars Alpha Tokens* (KAT) (KotoWars, 2019a). The owners of the game supported the initiative and promoted it on official *CryptoKitties* channels, and even the major blockchain analytics company CoinGecko demonstrated their support and listed the new token in their analytics (CoinGecko, 2019). However, the KAT tokens were never traded, which means that they were valueless in the field of blockchain adopters. As long as a game asset cannot be converted into financial capital, it is worthless in the field of crypto games.

But maybe this particular game mod has brought more gamers into the community, or, at least, satisfied their need for better games? Due to the designed transparency of blockchain, it is possible to track all players of tournaments by the KAT tokens that they received proportionally to their success in the game. Tournament tables available on *Kotobaza* also demonstrate that the best results belonged to the *CryptoKitties* ‘whales’ who already were very engaged in the gambling and speculation aspect of the game. Altogether, 78 players participated in *KotoWars* in 2019, although only about 15–20 players would return to the game several times. The top seven players who own more than 100 tokens can also be identified as ‘crypto whales’ and hardcore *CryptoKitties* players (Figure 6).

Now fancies were suddenly not valuable enough in terms of game design: they were specifically excluded from the first version of *KotoWars* because they have “customized appearance which doesn’t follow the regular logic of assembling the kitty image” (KotoWars, 2019b). The game system was prioritized over its visuals, but ultimately it did not help. Despite the very active 2019, *KotoWars* failed to gain traction anywhere apart from the already-existing community of *CryptoKitties* adopters on Discord. The *KotoWars CryptoKitties* wallet still remained active; tellingly, it was renamed “Hope” as of 2022. Informal observation suggests that some of the developers would still participate in the game or express fond memories of it on Twitter. While some of them seem to have made some success at trading NFTs for financial profit, they were unable to convert their gaming capital into any other form of capital that was acceptable in the crypto field.

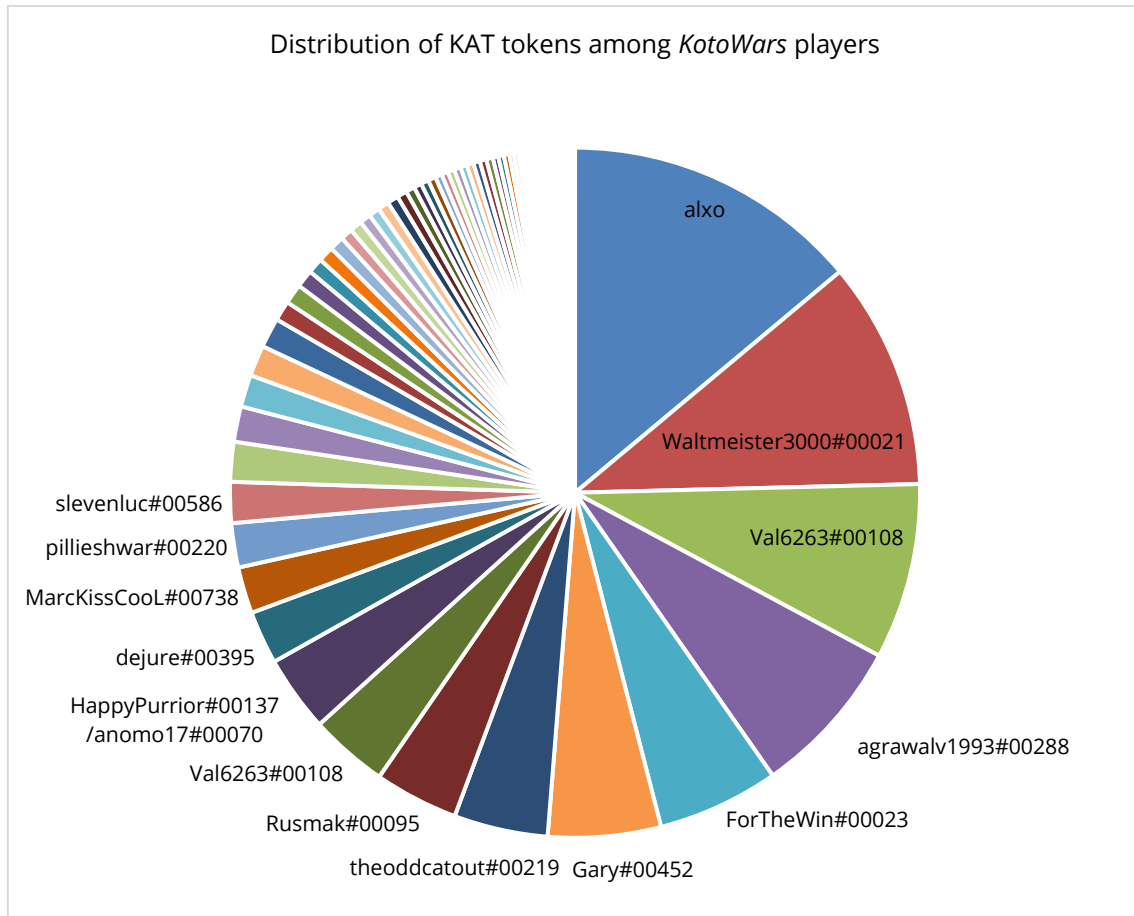


Figure 6. Relative shares of holders of KAT tokens labelled by their Discord name. Around 80% of tokens are distributed among approximately 20 returning players who played the game in 2019. Some players used more than one game account or cryptocurrency wallet. The data about the tokens is collected from CoinGecko (2021); the data about the players is collected from *KotoWars* (KotoWars, n.d.); two datasets are integrated by Ethereum wallet addresses.

Conclusion

This study has demonstrated that the flow of symbolic capital is directed by those who hold the most financial capital, or perhaps other forms of symbolic capital that are specific to the blockchain field. These newest forms of capital can become a very interesting subject for future research enquiries. This also resonates with Bourdieu's description of economy of cultural practices in *Distinction: A Social Critique of the Judgement of Taste*: "appropriation of legitimate cultural goods and the associated symbolic profits" (1987, p. 176) is defined by the structure of capital that the dominant classes possess, which is either financial capital (in the case of 'bourgeoisie') or cultural capital (in the case of the artistic bohème). In our case, the 'indie game bohème' that created *KotoWars* was not a competitor to cryptocurrency bourgeoisie (even though the same people could still represent a subset of crypto bourgeoisie in a different context, e.g., in NFT trading).

There is still charm, and the refreshing feeling of innovation, in such chaotic creative spaces as the *CryptoKitties* community. If only blockchain games were produced with respect to cultural rather than financial capital, they could result in new forms of cultural production where gaming capital could be exchanged for other forms, including financial capital, at a fair rate and without much friction, even if in a less direct manner. My choice of these particular cases shows that there is still hope for blockchain-based gaming, as long as it is about playing games, rather than profit-making. Although the story of *Catelot* was never fleshed out in play, it remains one of potential ways to revitalize the game due to imaginative character design based on RPG tropes. Despite its limited appeal, *Kotowars* remains one of the best pronounced attempts to build a player-driven experience in *CryptoKitties*. Besides, this field is in fact more equal and accepting in terms of gender and sexuality, which can be seen even in our example. This metaverse is not, however, a particularly safe space, unless one is 'crypto street-smart'—which, again, is often a matter of very specific social and symbolic capital in the crypto field that has not been studied well enough in this regard.

The emerging field of blockchain and crypto can be contrasted with the already well-established gaming community. Its rules have been thoroughly codified, starting from early gaming magazines (Consalvo, 2009; Kirkpatrick, 2012) and ending in today's rigid gender coding of gaming spaces (Paul, 2018). In the gaming field, direct conversion of gaming capital into financial capital goes against gamer ethics, according to which gaming capital is earned not just by gaming skills, but also by expert knowledge (Consalvo, 2009). In contrast, the 'rules of the game' in blockchain spaces are still fluid and improvised: these rules allow a high degree of cheating and deception, which is normalized in the community of cryptocurrency traders. This is in line with Bourdieu's studies of pre-capitalist societies that rely on covert circulation of social capital (e.g., his early research on Berbers in Algeria: Bourdieu, 1977). In Bourdieu's words:

Societies in which the degree of codification is slight, in which the essential things are left to a feel for the game and to improvisation, have a tremendous charm about them, and in order to survive in them, above all in order to dominate in them, you have to have a certain genius for social relations, and an absolutely extraordinary feel for the game. (1990, pp. 80–81).

This 'feel for the game' is the most important quality for the one who wants to win at a 'crypto game'. As a result, those who succeed in blockchain and cryptocurrency spaces easily outplay gamers who rely on their cultural values of 'fair play' and the specific gaming capital that is created based on these values.

The idea of decentralized production in games is not new. Since the beginning of electronic networks, players have been actively co-creating their own playful experiences in massively multiplayer games. The promise of blockchain gaming so far has

been to help them build the 'metaverse' together on their own terms. Nevertheless, the emerging virtual worlds, including *CryptoKitties*, favor the participants who have large amounts of 'crypto capital', or simply financial capital, starting with the owners of crypto games and game platforms. Generous venture capital investments are provided to them precisely because these future 'metaverses' can directly convert social, cultural, and gaming capital of players into financial capital of investors (as in the case of Square Enix: see Matsuda, 2022, 2023). And this is also nothing new: as Hector Postigo wrote 20 years ago in relation to early multiplayer game communities:

Paradoxically, the hobbyist status of game modders works against them as it situates their work outside of the programming profession, since commercial video-game companies are able to circumvent initial investments and maintenance costs for hired programmers and can simply choose from the most successful of the already-developed mods. (2003, p. 597)

This is the preferable mode of exchanging gaming capital into the financial one for major corporations, and crypto games seem to have followed this exact route, at least based on the cases that I have presented here. What starts as the creation of new value ends with the appropriation of the value created by the community, even though now it happens in new and more covert ways. One may admire the beautiful art of Catebot characters, but the names of the artists who created them remain unknown, in the same way as creativity is exploited in the traditional video game industry.

References

- Almohsen, H. A., Banaweer, G. M., & Alharthi, S. A. (2022). Players trust and awareness of blockchain gaming and NFTs. In *Graphics Interface*. <https://doi.org/10.13140/RG.2.2.22224.99844>
- Animoca Brands. (2022, March 15). *F1® Delta Time* to cease operations; announces rewards for supporters. *Animoca Brands* [blog]. <https://www.animocabrands.com/f1-delta-time-to-cess-operations-announces-rewards-for-supporters>
- Arnedo-Moreno, J., & Garcia-Font, V. (2022). Research opportunities in the application of blockchain in video games: A scoping review. In *2022 IEEE International Conference on Omni-Layer Intelligent Systems (COINS)*, 1–5. <https://doi.org/10.1109/COINS54846.2022.9854939>

- Axie Infinity. (2020). *Official Axie Infinity whitepaper*. <https://whitepaper.axieinfinity.com/>
- Axiom Zen. (2017). *CryptoKitties* [Web]. Dapper Labs. <https://www.cryptokitties.co/>
- Blockade Games. (2022). *Neon district* [Web]. <https://portal.neondistrict.io>
- Bourdieu, P. (1977). *Outline of a theory of practice*. Cambridge University Press.
- Bourdieu, P. (1986). The forms of capital. In J. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241–258). Greenwood.
- Bourdieu, P. (1987). *Distinction: A social critique of the judgement of taste*. Harvard University Press.
- Bourdieu, P. (1990). *In other words: Essays toward a reflexive sociology*. Stanford University Press.
- Bourdieu, P. (2018). Social space and the genesis of appropriated physical space. *International Journal of Urban and Regional Research*, 42(1), 106–114. <https://doi.org/10.1111/1468-2427.12534>
- Calvão, F. (2019). Crypto-miners: Digital labor and the power of blockchain technology. *Economic Anthropology*, 6(1), 123–134. <https://doi.org/10.1002/sea2.12136>
- Castronova, E. (2005). *Synthetic worlds: The business and culture of online games*. University of Chicago Press.
- Castronova, E. (2008). *Exodus to the virtual world: How online fun is changing reality*. Palgrave Macmillan.
- Castronova, E. (2020). Players for hire: Games and the future of low-skill work. In A. Larsson & R. Teigland (Eds.), *The digital transformation of labor: Automation, the gig economy and welfare* (pp. 200–212). Routledge.
- Chen, J.-T. (2020). Blockchain and the feature of game development. *Frontier Computing: Theory, Technologies and Applications (FC 2019)*, 1797–1802. Springer Singapore. <https://doi.org/10.1007/978-981-15-3250-4>
- Coffeezilla, (Director). (2022, December 17). *Investigating Logan Paul's biggest scam* [video]. YouTube. https://www.youtube.com/watch?v=386p68_IDHA
- CoinGecko. (2019). *Love what Kotowars is building* [Forum discussion]. Reddit. www.reddit.com/r/KotoWars/comments/axwd1o/love_what_kotowars_is_building/
- CoinGecko. (2021). *CoinGecko* [Website]. <https://www.coingecko.com/en/coins/bitcoin>
- Consalvo, M. (2009). *Cheating: Gaining advantage in videogames*. MIT Press.
- CryptoKitties. (2018a). *CryptoKitties: Collectible and breedable cats empowered by blockchain technology: White pa-purr* [White paper]. https://drive.google.com/file/d/1soo-eAaJHzhw_XhFGMjP3VnCcQoM43byS

- CryptoKitties. (2018b, May 2). KnightKitty rides again. *CryptoKitties Official Blog*. <https://medium.com/cryptokitties/knightkitty-rides-again-32fbddd87989>
- CryptoKitties. (2018b, November 16). What can I do with my CryptoKitty? *CryptoKitties Official Blog*. <https://medium.com/cryptokitties/when-you-purchase-a-cryptokitty-you-own-both-the-kitty-and-its-art-8f8f2a98c3d1>
- CryptoKitties. (2018c, July 31). What can you do with your CryptoKitties? *CryptoKitties Official Blog*. <https://medium.com/cryptokitties/what-can-you-do-with-your-cryptokitties-e5f472f65c67>
- CryptoKitties. (2019a, February 7). How to breed Page and other Fancy friends. *CryptoKitties Official Blog*. <https://www.cryptokitties.co/blog/how-to-breed-page-and-other-fancy-friends>
- CryptoKitties. (2019b, September 16). A new fancy cat has joined the Round Table of Catelot. *CryptoKitties Official Blog*. <https://www.cryptokitties.co/blog/a-new-fancy-cat-has-joined-the-round-table-of-catelot>
- CryptoKitties. (2022). *CryptoKitties catalogue - Fancy Kitties*. <https://www.cryptokitties.co/catalogue/fancies>
- DACOCO. (2021). *AlienWorlds* [Web]. <https://alienworlds.io/>
- Dapper Labs. (2019, February 12). Final results from the Gods Unchained and CryptoKitties partnership. *Dapper Labs*. <https://medium.com/dapperlabs/final-results-from-the-gods-unchained-and-cryptokitties-partnership-b0cd7e317a25>
- Dapper Labs. n.d. CryptoKitties: Fancy cats - Page's gang. *Dribbble*. Accessed 22 March 2022 from <https://dribbble.com/shots/9884654-CryptoKitties-Fancy-Cats-Page-s-Gang>
- Ducuing, C. (2019). How to make sure my Cryptokitties are here forever? The complementary roles of the blockchain and the law to bring trust. *European Journal of Risk Regulation*, 10(2). <https://doi.org/10.1017/err.2019.39>
- Dutton, N., & Consalvo, M. (2006). Game analysis: Developing a methodological toolkit for the qualitative study of games. *Game Studies*, 6(1). http://gamestudies.org/0601/articles/consalvo_dutton
- Gechev, V. (2022). The strengthening case to prohibit cryptocurrencies by law. *SSRN*. <https://doi.org/10.2139/ssrn.4203937>
- Hunter, D., & Lastowka, F.G. (2004). Amateur-to-amateur. *William and Mary Law Review*, 46(3), 951–1030. <https://scholarship.law.wm.edu/wmlr/vol46/iss3/3/>
- Joseph, D. J. (2018). The discourse of digital dispossession: Paid modifications and community crisis on Steam. *Games and Culture*, 13(7), 690–707. <https://doi.org/10.1177/1555412018756488>
- Kirkpatrick, G. (2012). Constitutive tensions of gaming's field: UK gaming magazines and the formation of gaming culture 1981–1995. *Game Studies*, 12(1). <http://gamestudies.org/1201/articles/kirkpatrick>

- KittyExplorer. (2021). *Kitty explorer* [Website]. <http://www.kittyexplorer.com/>
- KittyHelper. (2022). *KittyHelper* [Website]. <https://kittyhelper.co/>
- KotoBaza. (2022a). All Fancies in *CryptoKitties* cryptocollectible Game. *KotoBaza - Latest News from the CryptoKitties*. <https://ck.kotobaza.co/cryptokitties-fancies/>
- KotoBaza. (2022b). KotoBaza. *KotoBaza - Latest News from the CryptoKitties* [Website]. <https://ck.kotobaza.co/>
- KotoBaza. (2022c). Timeline of all Cattributes and Fancies in *CryptoKitties*. *KotoBaza - Latest News from the CryptoKitties* [Website]. <https://blog.kotobaza.co/timeline/>
- KotoWars. (2019a, January 8). *Kotowars* alpha tokens (KAT) for early adopters. *Medium*. <https://medium.com/@kotowars/kotowars-alpha-tokens-for-early-adopters-dd6d55d559eb>
- KotoWars. (2019b, January 10). How *Kotowars* interprets the *CryptoKitties* NFTs. *Medium*. <https://medium.com/@kotowars/how-kotowars-interprets-the-cryptokitties-nfts-dcd1234f9861>
- KotoWars. n.d. *CryptoKitties* in *KotoWars*. *KotoWars - Play with Your Cryptokitties*. Accessed 21 March 2022 from <https://kotowars.com/cryptokitties/>
- Kraft, D. (2019). *Game-theoretic randomness for blockchain games*. ArXiv. <http://arxiv.org/abs/1901.06285>
- Lapointe, C., & Fishbane, L. (2019). The blockchain ethical design framework. *Innovations: Technology, Governance, Globalization*, 12(3–4), 50–71. https://doi.org/10.1162/inov_a_00275
- Lee, J., Yoo, B., & Jang, M. (2019). Is a blockchain-based game a game for fun, or is it a tool for speculation? An empirical analysis of player behavior in *Cryptokitties*. *WEB 2018: The Ecosystem of E-Business: Technologies, Stakeholders, and Connections*, 141–148. Springer. https://doi.org/10.1007/978-3-030-22784-5_14
- Lee, S., Lee, J., & Lee, Y. (2022). Dissecting the Terra-LUNA crash: Evidence from the spillover effect and information flow. *Finance Research Letters*, 53. <https://doi.org/10.1016/j.frl.2022.103590>
- Lehdonvirta, V., & Castronova, E. (2014). *Virtual economies: Design and analysis*. MIT Press. <https://www.jstor.org/stable/j.ctt9qf5t6>
- Lehtonen, M. J., Vesa, M., & Harviainen, J. T. (2022). Games-as-a-disservice: Emergent value co-destruction in platform business models. *Journal of Business Research*, 141, 564–574. <https://doi.org/10.1016/j.jbusres.2021.11.055>
- Low, K. F. K., & Mik, E. (2020). Pause the blockchain legal revolution. *International and Comparative Law Quarterly*, 69(1), 135–175. <https://doi.org/10.1017/S0020589-319000502>

- Matsuda, Y. (2022). A New Year's Letter from the President. *SQUARE ENIX HOLDINGS News*. https://www.hd.square-enix.com/eng/news/2022/html/a_new_years_letter_from_the_president_2.html
- Matsuda, Y. (2023). A New Year's Letter from the President. *SQUARE ENIX HOLDINGS News*. https://www.hd.square-enix.com/eng/news/2023/html/a_new_years_letter_from_the_president_3.html
- Min, T., Wang, H., Guo, Y., & Cai, W. (2019). Blockchain games: A survey. *2019 IEEE Conference on Games (CoG)*, 1–8. <https://doi.org/10/ggikc9>
- Muse. (2020, September 1). Muse CryptoKitties. *Muse Official Website*. <https://www.muse.mu/news/cryptokitties-322231>
- Nichols, R. (2013). Bourdieu's Forms of Capital and Video Game Production. In J. C. Thompson & M. A. Ouellette (Eds.), *The Game Culture Reader* (pp. 30–46). Cambridge Scholars Publishing.
- Paul, C. A. (2018). *The toxic meritocracy of video games: Why gaming culture is the worst*. University of Minnesota Press.
- Pérez Latorre, Ó. (2016). Indie or mainstream? Tensions and nuances between the alternative and the mainstream in indie games. *Anàlisi*, 54, 15–30. <https://doi.org/10.7238/a.v0i54.2818>
- Pfeiffer, A., Kriglstein, S., & Wernbacher, T. (2020). Blockchain technologies and games: A proper match? *International Conference on the Foundations of Digital Games*. ACM. <https://doi.org/10.1145/3402942.3402996>
- Popper, N. (2021, February 8). Elon Musk and Snoop Dogg push cryptocurrencies to record highs. *The New York Times*. <https://www.nytimes.com/2021/02/08/technology/dogecoin-bitcoin-elon-musk-snoop-dogg.html>
- Postigo, H. (2003). From *Pong* to *Planet Quake*: Post-industrial transitions from leisure to work. *Information, Communication & Society*, 6(4), 593–607. <https://doi.org/10.1080/1369118032000163277>
- Sako, K., Matsuo, S., & Meier, S. (2021). Fairness in ERC token markets: A case study of *CryptoKitties*. *Financial Cryptography and Data Security. FC 2021 International Workshops*, 595–610. Springer. https://doi.org/10.1007/978-3-662-63958-0_42
- Scholten, O. J., Hughes, N., Deterding, S., Drachen, A., Walker, J.A., & Zendle, D. (2019). Ethereum crypto-games: Mechanics, prevalence, and gambling similarities. *Proceedings of the Annual Symposium on Computer-Human Interaction in Play*, 379–389. ACM. <https://doi.org/10.1145/3311350.3347178>
- Serada, A. (2020). Why is *CryptoKitties* (not) gambling? *FDG '20: Proceedings of the 15th International Conference on the Foundations of Digital Games*. ACM. <https://doi.org/10.1145/3402942.3402985>
- Serada, A. (2021). Vintage *CryptoKitties* and the quest for authenticity. *Proceedings of IEEE CoG*. IEEE. <https://doi.org/10.1109/CoG52621.2021.9619106>

- Serada, A. (2023a). *A list of 'Fancy' CryptoKitty tokens categorized by themes and possible story lines* [Dataset]. ResearchGate. <https://doi.org/10.13140/RG.2.2.307-41.60645>
- Serada, A. (2023b). *Effect of artificial scarcity on value of 'fancy' CryptoKitties* [Dataset]. ResearchGate. <https://doi.org/10.13140/RG.2.2.30274.25283>
- Serada, A., Sihvonen, T., & Harviainen, J. T. (2021). *CryptoKitties and the new ludic economy: How blockchain introduces value, ownership, and scarcity in digital gaming*. *Games and Culture*, 16(4), 457–480. <https://doi.org/10.1177/15554120-19898305>
- da Silva, I. R. R., & Omar, N. (2021). Real and virtual token economy applied to games: A comparative study between cryptocurrencies. In K. Arai (Ed.), *Intelligent Computing: Proceedings of the 2021 Computing Conference, Volume 2* (pp. 869–880). Springer International Publishing. https://doi.org/10.1007/978-3-030-80126-7_61
- Strehle, E. & Ante, L. (2020). Exclusive mining of blockchain transactions. *Scientific Reports 2020 – Conference Proceedings of the Scientific Track of the Blockchain Autumn School 2020*, 87–95.
- Tjahyana, L. J. (2022). Crisis response strategies during cryptocurrency crash: A netnographic studies of Lunatics Community. *Petra International Journal of Business Studies*, 5(2), 145–154. <https://doi.org/10.9744/ijbs.5.2.145-154>
- Valve. (1998). *Half-Life* [PC]. Sierra Studios.
- Valve & Hidden Path Entertainment. (2012). *Counter-Strike: Global Offensive* [PC]. Valve.
- Valve & Turtle Rock Studios. (2004). *Counter-Strike: Source* [PC]. Valve.
- Wales, M. (2023, January 20). Wizards of the Coast apologises for *Dungeons & Dragons* Open Gaming License fiasco. *Eurogamer*. <https://www.eurogamer.net/wizards-of-the-coast-apologises-for-dungeons-dragons-open-gaming-license-fiasco>
- Wilmoth, J. (2018, May 24). *CryptoKitties* quietly suspends 'CurryKitties' promotion. *CCN*. <https://www.ccn.com/cryptokitties-quietly-suspends-currykitties-promotion/>
- Zagal, J. P. & Björk, S. (2018). Game design and role-playing games. In S. Deterding & J. Zagal (Eds.), *Role-Playing Game Studies: Transmedia Foundations*, 323–336. Routledge.