How are notions of ownership of NFTs constructed in the virtual economy of the metaverse as presented by Mark Zuckerberg?

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Abstract

When Mark Zuckerberg announced Facebook's shift to Meta last year, it was a surprising move in the technology world. With possibilities to virtually connect all facets of life, including work, play, learning, and more, Zuckerberg's metaverse promises a true sense of presence in a virtual environment. Non-fungible tokens (NFTs) will play a vital part in the metaverse by serving as legal records of digital ownership to validate virtual goods and services. The ownership of virtual objects in the form of NFTs is unlike prior digital and virtual items due to their enhanced legality and exclusivity. The research used textual analysis to examine how Twitter users make sense of NFT ownership by assessing their views, fears, and speculations surrounding owning NFTs. The findings of this thesis reveal the multifaceted nature of ownership of NFTs. NFT ownership is characterized by low object awareness, ambiguous legal rights, and a perceived lack of control in the case of some NFTs. However, they are likely to become desirable status symbols in the metaverse due to their high self-investment nature, satisfying various utilities.

Keywords: NFTs, ownership, metaverse, Mark Zuckerberg

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Introduction

We all own hundreds of things in the real world. In most cases, owning something implies that it can be physically held, kept in our homes, and comes with a psychological sense of ownership (Gruning, 2017, p. 2608). However, owning things digitally implies they cannot be physically touched or used. They may provide an illusion of touch through the screen of the smartphone or tablet through which they are accessed (Leonardi, 2010). In-app purchases and Spotify subscriptions are already some of the common digital products and services we are comfortable with spending our money on (Hsu & Lin, 2016, p. 42). At the Meta Connect 2021, Mark Zuckerberg, the founder of Meta, presented his vision of the metaverse, a virtual world mirroring our real world (Meta, 2021). He stressed how more and more aspects of our everyday lives, like work and home, will gradually shift to the virtual realm (Meta, 2021). Just like occupying physical space and owning objects in the physical world, we will be occupying virtual spaces and owning virtual objects in the virtual world (Meta, 2021). The visions of the metaverse have already accelerated demand and need for new virtual products and services that we will use in our virtual existence, like virtual clothes for our avatars, gadgets, and more (Houston, 2021). A virtual product in the metaverse is an exclusively digital representation of a product (Houston, 2021). We have already seen some glimpses of virtual objects in the context of online gaming worlds. It might be a virtual depiction of a real product or a product that only exists in the virtual realm (Houston, 2021).

Non-fungible tokens—records of digital ownership stored in the blockchain—will serve as an important component of metaverse economy by enabling authentication of virtual possessions, property, and even identity (NFTs – the Metaverse Economy, 2021). Blockchain, in

its most basic sense, is a digital, decentralized, permissionless database (Wang Qin et al., 2021, p. 4). It is decentralized, which means it is not held by any one entity (Wang Qin et al., 2021, p. 4). It is speculated that the various virtual goods in the metaverse will be in the form of NFTs stored in the blockchain (NFTs – the Metaverse Economy, 2021). "The NFTs started initially with the digital art side but have really expanded to represent any digital type of asset in virtual worlds going forward," says Eric Anziani, COO of Crypto.com (NFTs – the Metaverse Economy, 2021). Because each NFT is protected by a cryptographic key that cannot be erased, copied, or destroyed, it allows for strong, decentralized verification of one's virtual identity and digital goods, which is important for the metaverse communities to succeed and communicate with each other (NFTs – the Metaverse Economy, 2021).

Owning NFTs in the metaverse appears to be distinct from owning digital services or goods. Currently, the nature of digital material limits ownership claims (Pfitzmann et al., 2000, p. 117). Since preventing digital content from being duplicated, redistributed, and manipulated is nearly unachievable, anybody can simply pretend to be the owner of a digital piece of material and resell it (Pfitzmann et al., 2000, pp. 117-118). While some ownership verification models exist, they cannot prevent digital items from being disseminated in an unsecured manner (Stini et al., 2006, p. 1). Pfitzmann et al. (2000, p. 118) emphasize the need for having true proof of ownership, i.e., being able to directly check the legitimacy of an ownership claim for a specific object. This is where NFTs come into the picture. Until now, digital goods and services did not come with a unique recognition value or code stored on a verified blockchain system. NFTs are built on the premise that their ownership can be easily verified through the blockchain. Furthermore, the abundant supply of online media and its free-flowing nature make it difficult to

assign value to it (Stini et al., 2006, p. 4). Because of its free availability via file transfers, a song or a video has almost no monetary value (Stini et al., 2006, p. 4). Authentic ownership, exclusivity, and uniqueness are difficult to establish online, complicating the process of determining how to value works made in the digital domain (Sotheby's, 2021). I suspect that before NFTs, this has never been feasible online in a sustained, scalable way. Wang Qin et al. (2021, p. 1) describe NFTs as a type of cryptocurrency which cannot be exchanged like-for-like (equivalently, non-fungible), making them suitable for identifying something or someone in a unique way. This characteristic of NFTs is likely to differentiate them from all the digital and virtual items that have come before them. NFTs seem to provide a new level of legitimacy and exclusivity in the ownership of online assets. This necessitates a rethinking and examination of ownership notions of virtual objects in the form of NFTs. It is intriguing to investigate how owners comprehend the possession of their NFTs by the legal rights gained, consumption pattern, usability, and other antecedents of ownership. Furthermore, given Zuckerberg's emphasis on the potential increased legitimacy and control over our virtual possessions in the metaverse, it becomes even more crucial to look into the ownership of NFTs in the context of the metaverse. He stressed the development of a formal trading ecosystem in the metaverse that will allow for the secure trading of NFTs (Meta, 2021). He also emphasized the importance of new forms of governance and rules to regulate and safeguard the distribution of NFTs in the metaverse (Meta, 2021). Furthermore, the ability to store and showcase our virtual possessions in our virtual homes, as well as control their movement (interoperability) between different virtual worlds, will likely add to their potential exclusivity (Meta, 2021).

Most of the current academic research in the realm of virtual products and services is

from economic and technological perspectives (Nazir & Lui, 2016; Lehdonvirta & Ernkvist, 2011; Castronova, 2006). From an economic standpoint, there seems to be a lot of interest in writing and talking about the speculative investment benefits of virtual goods. On the other hand, other research areas focus on the technological understanding of NFT blockchain and the development of the metaverse (Wang Qin et al., 2021; Dionisio et al., 2013). Furthermore, research on digital object ownership has largely been conducted in the context of digital items or virtual gaming worlds such as *Second Life* (Wyld, 2009; Pfitzmann et al., 2000; Stini et al., 2006). As we have reasons to believe that the NFTs ownership is going to be characterized by increased legality and exclusivity compared to previous digital and virtual products we have studied, it makes it important to build on our understanding of their ownership to enable meaning-making of what it denotes to own an NFT in the metaverse.

While NFTs may not be "real" in the traditional sense, many consumers appear to be willing to pay real money for them (Houston, 2021), and if the metaverse predictions are to be believed, the demand from users to buy, sell, and invest in virtual items and services, including virtual properties, is only going to increase (Nazir & Lui, 2016, p. 1). This trend has accelerated ever since the announcement by Mark Zuckerberg to transform Facebook into a metaverse company (Gilbert, 2022). Given the technological influence of Meta, a lot of companies are expected to follow suit and invest more in Zuckerberg's visions of the metaverse.

These concepts raise an important question of "How are notions of ownership of NFTs constructed in the virtual economy of the metaverse as presented by Mark Zuckerberg?" Considering how the metaverse is still very much a work in progress and there exists varying perspectives on what the metaverse will look like, for the purpose of this thesis, the concepts

introduced by Mark Zuckerberg in Meta Connect 2021 (Meta, 2021) will be the basis of my understanding of the metaverse.

To answer the question, the topic will be approached through a theoretical framework that elaborates on the growth of the larger digital and virtual economy in which NFTs are traded. I will briefly trace the historical and economic journey that the virtual economy of the metaverse has emerged from. I will further investigate the nature of ownership in the digital era, and by exploring psychological and legal antecedents of ownership, I will develop a vocabulary for this thesis to recognize notions of ownership of NFTs in the metaverse. Since NFTs are heavily discussed and debated in online media, it will be relevant to use the above theoretical concepts to analyze Twitter discussions surrounding the discourse of ownership of NFTs using a textual analysis method. Since Zuckerberg's description of NFTs in the metaverse resembles the existing nature of NFTs, I will be looking closely at how people talk about this phenomenon in a general sense—their thoughts, fears, and speculations surrounding owning NFTs to comment on how NFT ownership will likely develop in the context of the metaverse presented by Mark Zuckerberg. Thus, the research method will enable me to theoretically unpack on NFT ownership notions in Mark Zuckerberg's metaverse by examining tweets on how people speak about NFT ownership generally.

Theoretical Framework

Understanding Digital & Virtual Economy

The beginning of the twenty-first century saw an acceleration of the digitalization and virtualization of the economy (Vyshnevskyi, 2019, p. 7). The terms "digital economy" and "virtual economy" have been defined by a number of academics either individually or in tandem, but never in opposition to one another (Vyshnevskyi, 2019, p. 9). Since the two economies frequently overlap, exploring their definitions is critical in order to compare and contrast their ownership features in reference to the metaverse economy. This will also allow for tracing the roots of the metaverse economy and, in turn, develop a frame of reference for understanding NFT ownership.

The digital economy is the global network of economic activity facilitated by information and communication technologies (ICT) (Deloitte Malta, 2021). It covers products or services whose creation, sale, or delivery heavily relies on digital technologies (Deloitte Malta, 2021). In simple terms, the digital economy comprises trade of any objects such as music, video, images, news articles, and any other goods that can be represented in digital form.

Vyshnevskyi (2019) provides two important frames of reference for understanding the rise of the virtual economy. The first approach considers the virtual economy as a higher level of the digital economy (Vyshnevskyi, 2019, p. 14). The second approach considers it a part of the digital economy in the form of virtual online worlds (Vyshnevskyi, 2019, p. 14). The term "virtual economy" was coined by Edward Castronova (2006, p. 815) to describe artificial economies seen in online games, particularly when those economies' artificially scarce

products and currencies were traded for real money. This is around the time when the internet and personal computing began to enable real-time interactions between users in the form of Massive Multiplayer Online Role-Playing Games (MMPORPGs) (The Virtual Economy, n.d., "The Early Days of Virtual" section). It not only made it possible for a huge number of players to interact or play with one another, but also to exchange virtual currencies, objects, and characters in a virtual fantasy world (The Virtual Economy, n.d., "The Early Days of Virtual" section). The work of Lehdonvirta and Ernkvist (2011) is crucial in this regard. In the book, *The Knowledge Map of the Virtual Economy*, they explore how trade of virtual goods in games was initially limited between players. However, with the rise of demand for more sophisticated game items and avatars, commercial suppliers entered the market (Lehdonvirta and Ernkvist, 2011, p. 9). The concept of virtual economy has gained traction as virtual currencies have begun to be employed in online services other than games, such as social networking sites and crowd-sourcing platforms (Lehdonvirta and Ernkvist, 2011, p. 5). The majority of the virtual economy today thrives on massive multi-participant platforms like *Roblox* and *Fortnite* (The Virtual Economy, n.d., "The Marketplaces" section). These platforms have been designed to have, or eventually develop, internal markets and economies with their own currencies that players use to buy and sell virtual goods and services (Lehdonvirta and Ernkvist, 2011, pp. 9-10). While the digital economy produces things such as videos or images, and any other goods that can be represented in digital form, the virtual economy comprises virtual assets like virtual weapons, avatar outfits, and more, which can be consumed in virtual environments. This understanding of the virtual economy is relevant for comprehending the origins of the NFT and metaverse economies. It lays the groundwork for understanding how the metaverse and NFT

economies will likely grow from the frameworks and foundations established by the virtual economy.

I suspect that the metaverse economy will develop into a higher level of virtual economy with sophisticated commercial ecosystems and object trading. This is already evident with the increased legitimacy that comes with NFTs stored on a unified digital ledger, preserving the uniqueness of each asset. There will most likely be a metaverse marketplace where virtual homes, characters, currencies, and other items will be traded as NFTs, similar to in-game marketplaces in virtual gaming worlds, but with greater legitimacy. Since the metaverse is being built with the objective of providing a virtual platform for various spheres of everyday life, the metaverse economy is expected to be even more expansive with diverse goods and services in the form of NFTs. It will likely be broader than the virtual economies of games like *Fortnite*, which are mostly limited to in-game items purchased for completing game levels, such as weaponry and health potions. This provides a crucial framework for assessing NFT ownership in the metaverse economy. Owners of NFTs will likely feel more secure and in control of their goods and services with a sophisticated governance structure for trading NFTs in place. Furthermore, a larger metaverse economy with more choices will allow for social distinctions and status signaling, shaping ownership notions.

Nature of Ownership & Impact of Technological Advancement

Ownership has always been one of the most inherent needs of human beings (Nancekivell et al., 2019, p. 1). With the beginning of civilization, we started marking out territories and proclaiming ownership of cattle and crops. In traditional capitalist markets (before

the advent of the digital economy), physical goods & services were largely characterized by sole, private ownership (Morewedge, 2021, p. 125). They came along with a ‘bundle’ of rights wherein the owner could limit use of the object from others, modify, sell, or make profit from it (Morewedge, 2021, p. 125). Besides the legal benefits, the goods and services also came with a psychological feeling of ownership (Morewedge, 2021, pp. 125-126). Psychological ownership arises when a person feels that an object is "MINE" (Morewedge, 2021, p. 125). It can be considered a form of emotional attachment between consumers and the goods and services they use (Morewedge et al., 2020, p. 197). It is this psychological sense of ownership that makes us feel ownership over things like our ideas, our favorite piece of jewelry, etc.

With technological advancement, the nature of ownership for digital goods and services started evolving in digital economies (Morewedge et al., 2020, p. 197). Modern digital capitalist society introduced a new access-based model in which people purchase temporary access to certain digitally shared experiential goods (Morewedge et al., 2020, p. 196). In *Evolution of Consumption: A Psychological Ownership Framework,* Morewedge et al. (2020, p. 196) argue that the technological revolution brought about at the turn of the 20th century marked a crucial shift from a largely legal to fractional ownership systems. For example, instead of owning cars privately, people began sharing cab services through digital apps such as *Uber*. With the rise of social media platforms, e-books, digital streaming services and more, the access-based model has emerged as the more economical and convenient form of ownership (Morewedge et al., 2020, p. 198). By eliminating private ownership of items, consumers can better align their preferences, avoid the entanglements associated with sole ownership, and take advantage of sustainable consumption opportunities for both scarce and new goods that would otherwise be unrealizable

or unaffordable (e.g., luxury goods and social media platforms) (Morewedge et al., 2020, p. 198).

In the case of virtual products and services seen in the virtual gaming world, the ownership seems to be characterized by a return of private ownership with limited rights. Users pay once for a virtual object and then own or possess it, similar to physical goods and services (Nazir & Lui, 2016, p. 12). Players often have to invest significant time and game resources in completing game levels in order to obtain these virtual items (Lehdonvirta & Ernkvist, 2011, p. 9). They can enjoy the use of virtual goods as long as they are in the game environment. As soon as the game ends, access to the item is also limited (Lehdonvirta & Ernkvist, 2011, p. 9). In the case of NFTs in the metaverse, it appears that sole private ownership is likely to continue but with increased permanent legal access as NFT ownership is recorded on a decentralized digital ledger. Users will be able to buy a piece of virtual land as NFT and continue to be the legal owner of the property for as long as they wish. However, it might mean that they may not come with the same economic benefits as access-based digital goods, as we have already seen some NFTs being sold for millions.

The shift to an access-based model in the digital economy brought some economic benefits, but it also brought changes to our understandings of psychological ownership (Morewedge et al., 2020, pp. 198-199). These new digital goods and services we have now become accustomed to are typically shared with strangers and businesses (Morewedge et al., 2020, p. 200). Instead of being the sole owner of a movie DVD, we now share access to thousands of Netflix shows with millions of viewers. Morewedge et al. (2020, p. 200) argue that this fractional ownership divides property rights among users and impairs perceived control over access-based goods, thereby seriously compromising psychological ownership. Consumers

do not see it as "mine," unique, or special (Morewedge et al., 2020, p. 200). In the case of virtual goods from gaming worlds, sole private ownership likely strengthens a psychological sense of ownership. However, their limited usage in the game environment might also restrict the feeling of "mine." For instance, everything that users produce and own in *Minecraft* (virtual farms, houses, or produce) is the property of the virtual world providers. While these factors may also be true for NFTs in the metaverse, I suspect that since NFTs are being developed to have everyday use in the metaverse, owners will still have a strong sense of psychological ownership due to developing an affinity or close relationship with the virtual item. Even if NFTs begin to be fragmented and owned collectively in the metaverse moving forward, I suspect that due to their inherent everyday function in the metaverse, owners will still have a strong sense of psychological ownership.

Antecedents of Legal & Psychological Ownership

Several scholars have tried to define antecedents through which ownership can be measured or identified. These antecedents are factors with which we associate ownership. They reveal prominent factors to look for while evaluating ownership of NFTs in the metaverse. They also allow for the development of a vocabulary through which notions of ownership can be constructed for NFTs.

Legal Ownership

Legal ownership of an object is often assigned to the person or entity that has a "bundle" of property rights (Morewedge, 2021, p. 125), such as the rights to:

(i) Control usage: this refers to the right to use the item while excluding others (Morewedge, 2021, p. 125). This right encompasses having sole control of an object and the right to maintain it, i.e., the assertion that others should not interfere without permission (Honore, 1961, p. 231). Looking into the degree of control provided by the legal rights of NFTs will help indicate the perception of legal ownership. One of the most significant aspects of the owner's position is that he or she should be able to anticipate being the owner indefinitely (Honore, 1961, p. 231). Controlling use also entails having the ability to regulate it—the right to choose how and by whom one's property is utilized (Honore, 1961, p. 232). As discussed in the case of digital experiential goods, the owners are unable to control usage of the object by others as all the owners enjoy equal usage rights (Morewedge et al., 2020, p. 200). However, I suspect that due to NFTs being stored on a decentralized blockchain, owners would be able to easily claim their legal rights and limit others' access.

(ii) Profit: this refers to the ability to benefit or profit from a possession (Morewedge, 2021, p. 125). The owner should also have the right to gain by foregoing personal use of a thing and allowing others to use it for payment (Morewedge et al., 2020, p. 125)—a right that is largely non-existent for digital goods like music subscriptions. Online gaming worlds usually have a varying degree of rights when it comes to reselling for profit, as game developers try to restrict these rights to themselves (Nazir & Lui, 2016, p. 12). I suspect that since NFTs are frequently in the media in reference to their investment benefits, they are likely to be perceived as high-value items and their private legal ownership would mean that they are frequently traded for profit.

(iii) Trade or destroy: the owner has the choice to sell, change, or get rid of the item (Morewedge, 2021, p. 125). This encompasses the right to capital, which entails the ability to alienate the object as well as the freedom to consume, squander, or destroy it in whole or in part (Honore, 1961, p. 235). Owing to the largely immaterial and digital nature of items in digital and virtual economies, it is likely that completely getting rid of them or destroying them might be beyond the control of the owner, thereby limiting their legal right. I suspect that this might be true in the case of NFTs as well. However, trading NFTs is likely going to be quite common due to their speculative investment benefits.

(iv) Transfer rights: The owner should be able to exercise his or her rights to transfer the object to other agents (Honore, 1961, p. 235). In most cases, an owner possesses both the power of disposition and the power of title transfer (Honore, 1961, p. 235). Most digital goods do not provide the option to transfer rights (like in the case of Netflix subscription) and game economies also have varying degrees of rules surrounding the transfer of virtual items (Lehdonvirta & Ernkvist, 2011, p. 12). However, I suspect that the legal nature of NFTs may allow the transfer of rights in the metaverse.

Psychological Ownership

Psychological ownership for items is thought to develop from three antecedents, according to several psychological and organizational theories: perceived control, self-investment, and intimate understanding (Morewedge, 2021, p. 125).

(i) Perceived Control: Physically managing items by touching and holding them, according to Morewedge (2021, p. 126), instantiates psychological ownership. Physical

control may instantiate psychological ownership so fast that people experience psychological ownership of an object they are now using (but do not own), but this sensation fades as soon as the thing is restored to its legal owner (Morewedge, 2021, p. 126). A fitting example of this is rented apartments. Tenants are likely to feel strong ownership as long as they live in it, but the sense of ownership is likely to fade away quickly once they move out. We can already assume that perceived control over NFTs is likely to be less compared to physical objects owing to their intangibility, similar to digital experiential goods. A lack of actual control over assets, such as digital commodities, prevents the establishment of psychological ownership of such objects (Morewedge, 2021, p. 126). More abstract forms of control, such as picking an object and controlling when, how, where, and at what rate it is used or consumed, can also serve as indicators of psychological ownership (Morewedge, 2021, p. 126). Depending on the nature of NFT, the control that owners can exercise over them is likely to be varied. For instance, in the case of NFTs in the form of art whose value is obtained from visual pleasure, owners might be restricted from avoiding others from consuming it. However, in the case of NFTs as virtual clothing, owners might be able to easily avoid others from using them in the metaverse.

(ii) Self-investment: Morewedge (2021, p. 126) asserts that people have a stronger psychological attachment to goods in which they have committed resources such as their own time, work, or money. When people have held something for a longer time, spent their effort in its construction, or paid money for it, they have a larger sense of psychological ownership for it (Morewedge, 2021, p. 126). The high price paid for NFTs

is likely to strengthen the owner's self-investment. Moreover, the high time and resources invested in minting NFTs (similar to in-game items) might also lead to increased psychological ownership.

(iii) Intimate Knowledge: The development of deep knowledge of items through a "living connection" with them is a third suggested antecedent of psychological ownership (Morewedge, 2021, p. 126). It refers to having a deep and comprehensive understanding of the nature of usage and the characteristics of the object (Morewedge, 2021, p. 126). I suspect that since NFTs will be crucial for our virtual lives in the metaverse, their frequent usage is likely to strengthen their understanding and, in turn, deepen psychological ownership.

Methodology

To address the research question, I will perform a textual analysis on a collection of tweets capturing the discourse around NFT ownership. Textual analysis of the tweets will aid in identifying the underlying meaning embedded in Twitter users' perceptions of NFT ownership, allowing me to then theoretically comment on how NFT ownership notions are likely to take form in the metaverse. I have employed the textual analysis proposed by Duan (2020), which incorporates the methodology suggested by McKee (2001) and Tracy (2012). In communication and media studies, textual analysis is thought to encompass a variety of research methods, including content analysis, discourse analysis, critical discourse analysis (CDA), multimodal analysis, and narrative analysis (Duan, 2020, p. 13). McKee (2001, p. 3) defines the specific textual analysis discussed in this study as a methodology to understand the ways in which people of diverse cultures and subcultures create meaning of who they are and how they fit into the everyday world. McKee (2001, p. 3) argues that textual analysis enables academics to analyze texts (movies, tv series, books, commercials, and so on) in an effort to attempt and acquire a sense of the ways in which people, in specific cultures at specified times, make sense of the world. Thus, for this study, textual analysis is appropriate to investigate Twitter users' narratives via their tweets to determine how they engage in sensemaking of NFT ownership in the metaverse.

Since the texts, i.e., the comments on Twitter are usually written from a range of different standpoints (McKee, 2001, pp. 17-18), textual analysis allows recovery and comprehension of the online discussions in a comprehensible fashion (McKee, 2001, pp. 15-16). The Twitter community frequently discusses their stories and experiences with

NFTs—their thoughts, fears, motivations, purchase intentions, and the expected nature of consumption. These discussions are often mediated by NFT or metaverse influencers. Thus, analyzing Twitter discussions triggered by influencers is the most efficient way of extracting relevant corpus for this research. The first step in selecting the corpus included compiling a list of some of the most prominent Twitter influencers who engaged in discussions around NFTs or/and metaverse (Maganis, 2022; GlobalData, 2021). Next, discussions related to NFTs were filtered down using the custom search settings from the Twitter handles of the selected influencers. All the 69 collected tweets were bookmarked between March-August 2022 and copied into a spreadsheet for analysis[1]. Since NFTs are also currently traded outside the metaverse to serve other utilities, I captured how people speak about NFT ownership generally as an indicator of their perceived ownership in the metaverse. Furthermore, since Zuckerberg's description of NFTs in the metaverse resembles the current nature of NFTs, it was important to not limit the corpus to metaverse-related NFT ownership discourse.

When analyzing the tweets for the study, I adopted a constant comparative method with two stages as presented by Duan (2020, pp. 15-16). First, during the primary-cycle coding stage, all tweets were put into a single column, and a parallel column was created to capture thematic components and short codes that arose from reading the content. I noted each

[1] The corpus of all 69 tweets utilized for analysis, as well as the primary and secondary coding steps employed can be accessed here: https://filesender.surf.nl/?s=download&token=5285d985-8f3c-4d39-9c1c-9afae566bbe4. The first sheet of the spreadsheet contains all the tweets, along with their respective authors and URLs. The second sheet contains the primary-level codes corresponding with the tweets. The third sheet shows secondary-level codes (antecedents of ownership) linked to primary-level codes.

tweet's textual content line by line, comparing each new line with the one before it. Codes such as "status symbol," "legal rights," and "duplicability of NFTs" emerged from the corpus after complete reading and making sense of the major topics. For example, a tweet expressing concern about someone simply replicating their NFTs was categorized under the broad theme of "duplicability of NFTs." During the secondary-cycle coding phase, Duan (2020, p. 16) proposes identifying the themes that arise from the first level codes and further classifying them into conceptual categories at a higher degree of abstraction. Thus, I added a third parallel column to the Spreadsheet to connect the first level broad themes with Morewedge's (2020) antecedents of psychological and legal ownership in order to further classify them into conceptual categories. This was done after noticing certain similarities in the first-level codes. For example, the subject "duplicability of NFTs" was associated with perceived control, which is a precursor to psychological ownership. This is because the theme suggests that owners feel a lack of control over the ease with which their NFTs may be replicated. The process included two more rounds of rereading the spreadsheet content; regrouping the material and pertinent codes; and more readings of the ownership literature to further investigate the emergent ideas, which were developed inductively. The final stage is gradually refining the substance of emergent concepts and entering the narrative-writing phase (Duan, 2020, p. 16). As a result, I gradually refined the basis of emerging themes and moved on to the phase of writing narratives and evaluating data with illustrations.

Analysis

The views expressed in the tweets collected show a range of perspectives on how people interpret NFT ownership. In this section, I have framed the collected tweets into five categories in order to address the research question: (1) Knowledge of NFTs; (2) Duplicability of NFTs; (3) Status value of NFTs; (4) Utilities of NFTs; and (5) Legal rights of NFTs.

Knowledge of NFTs

The first key broad topic or aspect relevant to analyzing NFT ownership notions is the low awareness of NFTs. Some findings and corresponding examples are summarized in Table I. In the primary cycle-coding phase of the twitter data analysis, limited understanding of NFTs appeared as one of the broad themes. Twitter users have emphasized that NFT is still in its early stages, with much to be seen in terms of how its true nature emerges in the metaverse. 11 of the 69 tweets collected indicated either existing low knowledge of NFTs or potential increased knowledge in the future. The following are some instances that illustrate the point:

As Mike "Beeple" Winklemann, who triggered a historic era of development in the NFT marketplace by selling his digital art for $69.3M early last year (Frank, 2022) and one of the most well-known NFT influencers on Twitter, has frequently stated, "as I mentioned many times in interviews, this technology is EXTREMELY broad and flexible and we are at the absolute beginning" (Winklemann, 2021). Twitter discussions indicate that there is a lot that is yet to be "discovered" and "learned" about NFTs. They further stress that "Nobody has figured it out yet, but the rate of evolution is very very fast" (Punk6529, 2022). In fact, the various NFT projects at the moment are "trying to play" the game or position their NFTs differently – some bundle them

with "Commercial rights", some stress their "Utility", several simply sell them as "Great art", and a lot of them are positioning them with their potential value in "Metaverse" (Punk6529, 2022). As a living example of the diverse forms that NFTs can take, *Punk6529* (2022), another popular Twitter influencer, shared the world's first UNESCO heritage site in Barcelona to become a live NFT. "Thanks to the NFT technology, the art piece is alive as it changes depending on the climate data it collects from the city in real-time and the ephemerides that the Casa Batlló façade celebrates, the piece is infinite as it is under constant change," remarked Gary Gautier, director of Casa Batlló (ACN Barcelona, 2022). It allows us to imagine the infinite possibilities of the shapes NFTs can take. Twitter users argue that since NFTs are still evolving, no one really knows what their ultimate adoption and use will look like. Furthermore, some Twitter users stress that "If you are here in NFT twitter in 2022, you are, in fact early to the cutting edge of digitization. Don't walk out and go home. Even if you are broke, stay engaged, learn, work." (Punk6529, 2022). Several strongly believe that the world is heading towards "100% certain increased digitization" in which NFTs will play a crucial role (Punk6529, 2022).

Table I. Twitter users' reactions towards limited knowledge of NFTs

Category of Broad themes	Examples of Tweets	Antecedents of ownership
Limited Knowledge of NFTs	"as i mentioned many times in interviews, this technology is EXTREMELY broad and flexible and we are at the absolute beginning" (Winklemann, 2021) "Nobody has figured it out yet, but the rate of evolution is very very fast" (Punk6529, 2022)	Limited awareness & self-involvement (psychological ownership)

In the phase of secondary-cycle coding, this limited awareness of NFTs was correlated

with limited self-involvement and knowledge of the object as an antecedent of psychological ownership. According to Morewedge (2021, p. 126), knowledge of the object is strongly linked to its psychological ownership. The better someone understands an object they own, the stronger their sense of ownership. For example, there is still a lot of ambiguity around the legal rights associated with holding an NFT (discussed in the next section), which impacts how confident owners feel about their possession. For psychological ownership to develop, owners require considerable self-involvement in understanding all the aspects of the object (Morewedge, 2021, p. 126). The more time spent engaging with the object, the greater its comprehension and accompanying feelings of ownership (Morewedge, 2021, p. 126). Thus, at the moment, psychological ownership of NFTs is not as strong as it could be due to limited awareness and self-involvement. NFTs have only recently experienced a tremendous growth in their popularity and trade (Frank, 2022). Until the beginning of 2021, NFTs were largely unknown, occupying a small section of the crypto business (Frank, 2022). Twitter users frequently stress that the true nature of NFTs will emerge only in the long run. As more people are exposed to the NFT world in the coming years and NFTs progressively become a part of our daily lives in the metaverse, the nature of their usage and structure will naturally become more evident, leading to people feeling more confident in owning them. *Punk6529* (2022) argues that if we remain in the digital space of crypto, NFT, and metaverse, the prospects of "unlocking their potential" are very decent (Punk6529, 2022). Furthermore, some users have put importance on the development of the metaverse to allow complete adoption of NFTs: "The scale of this metaverse will take years to build out to support true mass adoption" (JRNY Crypto, 2022). Thus, as NFTs become more common and ambiguity around them slowly goes

away, psychological ownership is expected to get stronger. We can see parallels in the digital goods industry as well. Over the years, we have witnessed a shift from physical DVDs to digital music subscriptions like Spotify. As understanding of the digital subscription model grew, consumers began to feel more confident about owning digital objects (Morewedge, 2020, p. 196).

Duplicability of NFTs

The second factor used to classify the data in this research is Twitter users' perceptions of NFT duplicability and originality. Some findings and corresponding examples are summarized in Table II. The copying or duplication of NFTs is a contentious issue on Twitter. In the collected corpus 8 out of the 14 tweets surrounding NFT duplicability doubted or questioned the uniqueness of NFTs owing to their ease of duplication. On the other hand, 6 Twitter users argued against easy duplicability of NFTs. The following are some examples:

In May of this year, Elon Musk, CEO of Tesla and SpaceX, tweeted, "I dunno...seems kinda fungible" (Musk, 2022) after turning his profile picture into a collage of screenshotted *Bored Apes* to taunt NFT owners. Collectors regard *Bored Apes* as one of the most desirable and valuable art NFTs (Locke, 2022). Many Twitter users saw this as a mockery of NFT’s most important feature: they are one-of-a-kind and cannot be duplicated (Locke, 2022). An interesting response to Elon Musk's tweet came from *OkRenegade* (2022): "I could put a copy of the Mona Lisa in my living room and still not own the original". While some users doubted the uniqueness of NFTs and stressed that they can easily be copied: "BRO YOU CAN JUST RIGHT CLICK SAVE IMAGE" (Matception, 2021), others focused on how "You can't copy the

non fungible token but you can copy the jpeg", referring to NFT art (Cryptoverse520, 2022). Users who have been in the NFT space for a while have repeatedly claimed, "What you own here is accessible to everyone, it's your participation that remains unique. Don't build something for people to own, build something for people to experience, and make NFTs essential to it" (Ohhshiny, 2022).

Table II. Twitter users' reactions on duplicability of NFTs

Category of Broad themes	Examples of Tweets	Antecedents of ownership
Duplicability of NFTs	"BRO YOU CAN JUST RIGHT CLICK SAVE IMAGE" (Matception, 2021)	Perceived control (psychological and legal ownership)
	"You can't copy the non fungible token but you can copy the jpeg" (Cryptoverse520, 2022)	

In the phase of secondary-cycle coding, this duplicability aspect of NFTs was corelated with perceived control over the object as an antecedent of psychological ownership (Morewedge, 2021). It is also relevant to relate the duplication factor to 'control usage' as an antecedent of legal ownership (Morewedge, 2021). According to Morewedge (2021, p. 126), perceived psychological control refers to the ability of the owner to manage how, when, where, and at what rate the thing is consumed or used. Controlling usage legally entails exercising exclusive control over the item, limiting access, or preventing others from interfering without permission (Honore, 1961, pp. 231-232).

In the case of NFTs that are easy to duplicate, people are likely to feel a perceived lack of

control, both psychological and legal, over their NFT. When others use NFTs as their profile photos, repost them on social media, or claim them as their own, the owner may experience a lack of autonomy over their property. Legal ownership is also likely to be affected if the owner is unable to exercise exclusive control over the item (Honore, 1961, p. 231). While the legal framework in existence protects owners against copyright infringement, it is nearly impossible to enforce due to the enormous nature of the internet. Furthermore, because the owner only has legal ownership of the code linked to the original NFT, there is a gray area surrounding the resharing of a copy (Guadamuz, 2022). This ambiguity has a negative impact on NFT ownership as well, due to a lack of intimate knowledge of the object.

The non-fungibility of NFTs is the key argument used by supporters of NFTs in the corpus to emphasize their uniqueness. As previously discussed, each NFT is non-fungible, which implies that, unlike fungible assets like cash, one NFT cannot be swapped for another (Wang Qin et al., 2021, p. 1). Each NFT has a unique code linked to it, which is recorded on the blockchain, a digital database that certifies the uniqueness and ownership of every NFT ever transacted (Wang Qin et al., 2021, p. 1). So even if one may "copy" the associated art with an NFT, ownership can easily be confirmed through the blockchain. Furthermore, supporters of NFTs urge people to look past NFT's duplicability and focus on the underlying utility and value it delivers, which is its true essence. Much of what we know about NFTs today comes from the art industry, where artists commonly sell their work as jpegs, audio, or video NFTs, which are relatively easy to copy. NFTs that come in different formats, such as a virtual event pass in the metaverse, are likely to be more difficult to replicate. Furthermore, many NFT owners have expressed that they do not intend to keep their NFTs only for their own pair of eyes, especially

when it comes to NFT art, since art is meant to be shared with everyone. Besides, they see NFTs from the perspective of their larger utility. Their personal investment of time and effort in acquiring the object, as well as the larger utility value of NFT may serve to reinforce their sense of ownership, disregarding the duplicability aspect.

According to Meta, the Horizon Marketplace will function as metaverse's eCommerce realm (Meta, 2021). It will provide a platform for producers to trade their digital goods such as avatar clothing, merchandise, and other useful NFTs in the metaverse (Meta, 2021). This will not only permit much more commerce and contribute to the general growth of the metaverse economy, but it will also assure a highly safe and trustworthy trading platform (Meta, 2021). Stronger governance, stricter copyright regulations, and the more complex structure of virtual items used in the metaverse will make it more difficult for users to duplicate NFTs in the metaverse. Furthermore, the original owner can always be easily identified through the blockchain in case of a dispute. These factors will serve to strengthen the psychological and legal ownership of NFTs in the metaverse space.

Status Value of NFTs

The third dimension of viewers' perception of NFT ownership is the perceived social and cultural status attached to NFTs. Some findings and corresponding examples are summarized in Table III. Out of the 69 tweets, 10 tweets touched upon the social and cultural status value of NFTs and its possible identity as a status symbol. Examples were summarized as follows:

"NFT is slowly becoming the most sort after cultural and STATUS symbol." (Cryptobits72, 2022). Several Twitter users have shared their views on NFT occupying a strong

cultural and status power: "Wen we buy NFT, we buy the cultural symbol it represents" (0xsexybanana, 2022). "Aside from art, people seek for #NFTs to have a sense of belonging to the COMMUNITY and the culture that comes with it. This is a SIGN of what we are going to see in NFT in 2022 & beyond" (Cryptobits72, 2022). Users have tweeted that owning an NFT comes along with the status of being identified as belonging to a particular class of technologically advanced early adopters. This has also challenged the perception that the majority of the people today buy NFTs as an investment: "NFT means trend, status symbol and cultural identity. It means NFT buyers are more holders than traders." (EdwinOWANG, 2022). However, a few users have also stressed on NFTs largely occupying status within the tech-gated community: "I keep seeing NFT dorks talk about how an expensive NFT is a "status symbol" and look, that's true, but it only gets you status with other dorks because everyone else thinks you're a dork." (Glentickle, 2022).

Table III. Twitter users' reactions on duplicability of NFTs

Category of Broad themes	Examples of Tweets	Antecedents of ownership
Social & cultural status of NFTs	"Aside from art, people seek for #NFTs to have a sense of belonging to the COMMUNITY and the culture that comes with it.."(Cryptobits72, 2022) "NFT means trend, status symbol and cultural identity. It means NFT buyers are more holders than traders" (EdwinOWANG, 2022)	High self-investment (psychological ownership)

In the phase of secondary-cycle coding, the social and cultural status of NFTs was correlated with high self-investment as an antecedent of psychological ownership (Morewedge, 2021). As discussed before, Morewedge (2021, p. 126) argues that people have a higher sense of

psychological ownership of a commodity if they invested their resources or effort in its production or acquisition, or if they paid a significant price for it.

Signaling costs, alibis, and cachet are three traits that are regarded as crucial when assessing status symbols (Marx, 2021). To serve as proof of privilege, status symbols require what economists call signaling costs: acquisition must be challenging on its own (Marx, 2021). Twitter users have discussed the extremely high price paid in the case of some NFTs, which is an evident factor of signaling costs. Users have also stressed the high number of hours spent acquiring an NFT, having the correct technological expertise, and market landscape understanding, which also points towards the signaling costs of NFTs. In certain circumstances, NFTs also have an alibis. Alibis are logical justifications for ownership that allow the expense to be justified as anything other than an outrageous act of waste (Marx, 2021). These are the benefits that NFTs claim to provide, such as "exclusive memberships" and "metaverse-related utilities" (discussed more in the next sections). To some extent, NFTs also have a catchet i.e., evident affiliations with high-status groups (Marx, 2021). Owners of NFTs are currently distributed, forming a curious mix of gated online community, stock-holding club, and art appreciation society (Marx, 2021). Twitter users stress that NFT owners are largely early tech adopters who have a thorough grasp of the NFT market. Members of this group frequently function as influencers with a huge following on Twitter. We have seen similar status signaling in the virtual economy of online multiplayer games. Gamers frequently purchase expensive avatar outfits and in-game valuables with game money or game play hours in order to stand out and indicate social differences and relationships (Lehdonvirta & Ernkvist, 2011, p. 9). Some aesthetically pleasing gaming goods are prized only for their artificial scarcity and status

(Lehdonvirta & Ernkvist, 2011, p. 9).

The strong status signaling aspect of NFTs point to the high self-investment (Morewedge, 2021) nature of NFTs. People are likely to have stronger feelings of ownership towards NFTs due to their high cost, significant time and effort spent in understanding the nature and use of NFT, and participation within the wider NFT community. Furthermore, qualities linked with the self and positive self-associations are passed on to the good when there is a high level of self involvement, creating an emotional connection to the good and strengthening its perceived worth (Morewedge, 2020, p. 197).

In the context of metaverse, Brett "thebrettway" Malinowski, a Twitter NFT influencer, claims that "Verifiable ownership of assets, both physical and digital, tied to a universal online identity would maximize status signaling" (Malinowski, 2022). This is closely linked to Mark Zuckerberg's vision of the metaverse, in which users will be authenticated through their singular virtual identity (possibly protected in the form of an NFT) and their possessions securely identified through a unified virtual ledger like the blockchain (Meta, 2021). One Twitter user hypothesized that the unified virtual ledger will have a record of everything we have ever owned in the virtual realm: "while of course not REMOTELY perfect, the concept of unified digital ownership is definitely going to be "a thing" moving forward, like it or not." (Winklemann, 2021). This will make ownership much more visible, standardized, and tangible, which will in turn likely make social signaling much easier.

Utilities of NFTs

NFT utility is another important subject or aspect relevant to analyzing the perception of

NFT ownership. Some findings and corresponding examples are summarized in Table IV. In the primary cycle-coding stage of the data analysis of tweets, utilities provided by NFTs surfaced as one of the key themes. Utility NFTs are NFTs that have a specific use case, either in the real world or in the virtual world (Moralis, 2022). The corpus revealed 13 tweets surrounding the utility of NFTs. The following are some examples that illustrate the point:

The corpus appeared to be overwhelmingly in support of utility NFTs, with multiple tweets arguing that every NFT should come with an obvious usefulness: “The utility is everything in my view! Now we have a lot of projects that focus only on art. The utility will be the differential value that will separate you from the rest” (TertovNft, 2022). This sentiment has come up since the majority of present NFTs are in the art sector and NFT creators are under growing pressure to mint NFTs that have practical utility as well as artistic merit. Many argue that they should not have to pay so much for a piece of digital art, but that there should be some additional advantage, such as membership or services. Many Twitter users have shared utilities which are important to them, like "Real life or metaverse utility of entrance or entertainment", "Ability to redeem physical things or whitelist for other projects", "Connection to physical services or venues", "avatar collections" and more. Users have also expressed how NFTs with utilities are going to be more valuable going forward: “Depending on what type of utility and how much it's needed in their platform; this announcement can make demand surge.” (JRNYcrypto, 2022). Furthermore, several users also argue that utility NFTs are important because they have a very clearly defined use: “These are utility NFTs, and you know what you’re buying at least. Unlike the myriad of current projects with hazy future expectations and creators that are paid millions of $$$ up front.” (Beaniemaxi, 2022).

Table IV. Twitter users' reactions on utility of NFTs

Category of Broad themes	Examples of Tweets	Antecedents of ownership
Utility of NFTs	"These are utility NFTs, and you know what you're buying at least. Unlike the myriad of current projects with hazy future expectations.." (Beaniemaxi, 2022) "Depending on what type of utility and how much it's needed in their platform; this announcement can make demand surge." (JRNYcrypto, 2022)	High object knowledge (psychological ownership)

In the phase of secondary-cycle coding, the utility of NFTs was correlated with high object knowledge as an antecedent of psychological ownership (Morewedge, 2021). Morewedge (2021, p. 126) claims that having a strong grasp or knowledge of an object has a favorable impact on its ownership. Owners of utility NFTs have a better understanding of the product they own, which strengthens sentiments of ownership. They have a clear purpose and make it easy for owners to comprehend what they are used for (Moralis, 2022).

Furthermore, the shift from NFTs being purchased primarily for investment purposes (as in the case of most art NFTs) to utility based NFTs indicates that individuals are purchasing NFTs with a longer-term use in mind. Utility-based NFTs will be used frequently to fulfill numerous roles in the metaverse, since individuals will have virtual lives and will require virtual products and services in the form of NFTs to accomplish multiple functions (Meta, 2021). Membership exclusivity in places/events, wearables for avatars, music, and digital identities are anticipated to be among the most beneficial NFT utilities in the metaverse. According to Morewedge (2021, p. 126), if an owner anticipates using an object for a longer period in the future, sentiments of psychological ownership tend to strengthen. This contrasts with items

purchased with the goal of fast resale or flipping for profit. The concept of the endowment effect is also interesting in the context of NFTs. The endowment effect describes a situation in which an individual sets a higher value on an object that they already own compared to the value they would place on the same object if they did not own it (Ganti, 2021). Participants who were given a 90% probability of keeping an object at the completion of an experiment were more likely to show an endowment effect for it than those who were given a 10% chance of keeping the same object at the end of the experiment (Morewedge, 2021, p. 126). Thus, utility NFTs that are bought for long-term use in the metaverse will benefit from an increase in perceived value and a stronger sense of ownership.

Legal Rights of NFTs

The legal rights linked with NFTs are the fifth factor to consider in order to comprehend viewers' perceptions of NFT ownership. Some findings and corresponding examples are summarized in Table V. 16 out of the 69 tweets collected were surrounding legal rights that people gain with their NFTs. They were grouped together at the primary cycle-coding phase of the data analysis. The tweets revealed that there is widespread confusion regarding the legal rights that people acquire when they buy an NFT. This ambiguity likely makes it difficult to feel secure or in control of NFTs. NFT Twitter influencers routinely publish screenshots from NFT projects' terms and conditions agreements to enlighten and educate the community, as well as engage in important discussions with their followers surrounding their rights. In this section, I have grouped the most discussed legal rights into four: (i) Commercial rights, (ii) Intellectual rights or copyrights, (iii) Right to reproduce NFTs from existing NFTs, and (iv) Transferring rights. For the sake of making a structured and coherent argument, tweets are supported with a

theoretical understanding of each legal right.

(i) Commercial rights

Users on Twitter have expressed discontent with the inability to exercise commercial rights for some NFTs: "So what exactly is the point of owning an #NFT under a CC0 license (public copyright license) compared to say, having it right click and saved on your PC? I want my ownership represented, either under commercial or personal use rights." (Pranksy, 2022). Many NFTs only provide personal usage rights, not commercial ones, such as *Otherdeed* from the *Yuga* world: "...Otherdeeds are the first object in the Yuga universe with no commercial rights. They are non-commercial rights only..." (Punk6529, 2022). The commercial rights relate to the owner's right to use, copy, and display the work commercially (Osborne Clarke, 2021). Other NFTs, such as *Kodas,* allow for limited commercial rights as part of a license and are bound by agreements: "Kodas have commercial rights, but the agreement is much stricter and more limited than prior Yuga language. This is the key part, making it explicit that the rights are only available as part of a license and subject to the agreement." (Punk6529, 2022). Despite legally purchasing NFTs, owners may feel a lack of control over their possession owing to restricted rights, which has a significant impact on legal and psychological ownership (Morewedge, 2021, p. 126). Legal ownership is likely to be hampered by the inability to utilize the NFT at the owner's discretion, the lack of exclusive control over it, and the inability to prohibit the use of others from it (Honore, 1961, p. 231). Restricted commercial rights of NFTs also hamper the right to profit (Honore, 1961) from the object, another important determinant of legal ownership.

Table V. Twitter users' reactions on legal rights of NFTs

Category of Broad themes	Examples of Tweets	Antecedents of ownership
Legal rights of NFTs	"So what exactly is the point of owning an #NFT under a CC0 license (public copyright license) compared to say, having it right click and saved on your PC? I want my ownership represented, either under commercial or personal use rights. " (Pranksy, 2022)	Perceived legal and psychological control (legal & psychological ownership), right to profit (legal ownership), right to transfer (legal ownership)

(ii) Intellectual property rights

One misunderstanding surrounding intellectual property rights of NFTs is that when you buy an NFT, you get the complete asset and all of its rights (Guadamuz, 2022). However, one purchases just the metadata linked with the item, not the whole asset itself (Guadamuz, 2022). Brett "thebrettway" Malinowski, a Twitter NFT advocate, conducted a poll asking users "If you own an NFT do you own the picture?"— which a majority of responders answered affirmatively (63%), proving the misconception (Malinowski, 2022). The creator will often hold copyright and other intellectual property rights, while the buyer will be awarded a license to exhibit or use the underlying asset (Guadamuz, 2022). For example, in the case of art NFTs, the buyer purchases a license to code attached to the art piece, not the art itself. The high amount of money spent on NFTs may have contributed to some of the misunderstanding (Guadamuz, 2022).

(iii) Right to reproduce NFTs from existing NFTs

Due to intellectual property rights, there is also a misunderstanding about minting new

NFTs as an adaptation or replication of the original NFT (Guadamuz, 2022). Because the NFT is not the work itself, but rather a series of numbers connected to it, the owner does not have the right to duplicate the work to create a new asset (Guadamuz, 2022). For example, *Punk6529*, a Twitter user, reshared extracts from the legal rights of *Kodas*, an NFT project, that also restricts owners from creating derivative works of art from the NFT piece or any other NFT derived from it: "There is another two new restrictions on Kodas that don't exist for BAYC and MAYC (other NFT projects). you can't create NFTs using your Koda. This is a big change and comes from a gaming, not art, orientation, I assume." (Punk6529, 2022), implying that the owner of NFT does not have the right to transform it into a gaming NFT avatar and utilize or profit from it. This again hampers the perceived legal ownership of NFTs as owners are restricted from developing or benefiting from secondary assets of an object they own.

(iv) Transferring rights

Another important domain of discussion is surrounding the resale or transfer of rights of NFTs. Most NFT owners are obliged to pay a royalty to the creators during a resale, depending on the conditions included in the smart contract encoded in the NFT (Osborne Clarke, 2021). For example, NFT creators frequently set up an automated recurring payment of royalties or commission on any resale of the tokens, which may be easily traced through the blockchain where the NFT is recorded (Osborne Clarke, 2021). Users on Twitter have expressed discontent with a similar case involving Kodas NFTs: “If you dont pay Yoga (a metaverse space) a royalty on the sale of the Kodas (NFT) or if you transfer the NFT to a prohibited transferee, Yoga will nuke your Koda,” tweeted by *Punk6529* (2022). The corpus also revealed some unhappiness with NFTs' regularly shifting ownership rights. Terms and conditions are kept open so that

creators or sellers can add or remove rights at any time (Osborne Clarke, 2021). “So, literally with a tweet, Yuga can take away or restrict the (more limited) commercial rights for Kodas at their sole discretion” *(Punk6529, 2022)*.

In the phase of secondary-cycle coding, the ambiguity surrounding legal rights of NFTs was correlated with perceived legal and psychological control, right to profit and right to transfer as antecedents of psychological and legal ownership (Morewedge, 2021). How one perceives ownership is determined by the degree of control they have on modifying, reselling, or managing the asset (Morewedge, 2021, p. 125). Owners may perceive a loss of psychological control over NFTs as a result of the numerous limitations put on some essential legal rights. Furthermore, the confusing ownership rights of NFTs directly threaten psychological ownership by reducing the evaluability of their ownership (Morewedge, 2020, p. 201)—the difficulty of distinguishing who owns the assets, such as which rights belong to producers, owners, and intermediaries. Each may hold one or more of the legal rights, thereby impinging on perceived control (Morewedge, 2020, p. 201), a key antecedent of psychological ownership.

Conclusion

The topic of NFT ownership is a complicated one. The tweets textually analyzed for the study revealed a number of viewpoints on a variety of subjects concerning ownership of NFTs in the metaverse. The study revealed five key findings corresponding to the five themes explored in the analysis: (1) reduced psychological ownership due to limited overall knowledge and self involvement with NFTs; (2) reduced psychological and legal ownership due to limited control over duplicability of NFTs; (3) increased psychological ownership due to high self-investment social and cultural status of NFTs; (4) increased psychological ownership due to high object knowledge of utility-based NFTs; and (5) reduced psychological and legal ownership due to limited control over legal rights of NFTs. All the findings together aid in answering the research question, "How are notions of ownership of NFTs constructed in the virtual economy of the metaverse as presented by Mark Zuckerberg?"

The first key finding revealed that there is currently limited overall knowledge and self involvement with NFTs, leading to reduced psychological ownership, with the potential for knowledge enhancement in the future as the technology becomes more mainstream and owners better understand the nature of NFTs. In contrast, the finding corresponding to the fourth section of the analysis demonstrated a strong preference of Twitter users for utility-based NFTs since owners have better knowledge of NFTs that come with a clear purpose, strengthening psychological ownership. The third important finding concerns the duplicability of NFTs. The corpus demonstrated that in the case of some NFTS (such as art NFTs), owners may feel a lack of psychological and legal control over the reproduction or manipulation of their NFTs. With regard to the analysis of the social and cultural status of NFTs, the corpus revealed that NFTs are

seen as status symbols. This refers to the high self-investment nature of NFTs, as they require significant time and investment, resulting in increased psychological ownership. The last key finding, which corresponds to the fifth section of the analysis, demonstrated that NFT owners are aware that they have legal rights, but there is considerable ambiguity about which rights they can freely exercise. In the case of some NFT projects that do not provide basic legal rights such as commercial use and intellectual property rights, owners face a lack of legal and psychological control, resulting in reduced feelings of ownership. As the metaverse is largely discursive at the moment and the technology is still developing, the current ownership nature of NFTs can only give us hints of how its ownership is likely to take form in the metaverse. By linking the theoretical framework to the key findings, I can hypothesize that with a more improved commercial ecosystem for NFT trading and potential improvement in knowledge with regular usage, NFTs will experience higher psychological and legal ownership in the metaverse as a result of better object knowledge and stronger feelings of control over legal rights and duplication.

Furthermore, the thesis was able to add to the larger academic discussion surrounding the nature of ownership of online assets. The analysis indicated that NFTs do serve to provide a real sense of legitimate ownership as compared to previous digital and virtual objects. However, the understanding of this ownership still seems to be shrouded with ambiguity about the legal rights gained and uncertainty caused by duplicability in the case of some NFTs. Compared to previous virtual goods, owners do enjoy the exclusivity and uniqueness that come with NFTs, owing to the high social and cultural value of their possession. This contrasts with existing online assets, which are difficult to value and trace legally.

Overall, textual analysis of Twitter discussions using the constant comparative coding method enabled the recovery and comprehension of rich data themes relating to NFT ownership. It enabled efficient data grouping and the recognition of key ownership themes. Furthermore, the method allowed for the seamless integration of the ownership themes with Morewedge's (2021) antecedents of ownership, with the exception of a few themes. However, the manual coding process was time-consuming and prone to human error. The fragmented nature of the Twitter discourse, as a result of scattered Twitter threads, made it difficult to compile a comprehensive corpus for understanding the subject under study. To collect a relevant body of corpus centered on NFT ownership, corpus from tweets by Twitter influencers was chosen to avoid unfiltered promotional content entering the corpus. However, given that influencers are typically active supporters and ambassadors of NFT projects, there may be bias in some of the tweets gathered. Moreover, due to time and resource constraints, the corpus of the study was kept quite small, which made validating its findings slightly challenging.

This study is the first in a series of steps toward understanding the notions of ownership of digital and virtual objects like NFTs. This academic field can be explored further by conducting interviews of NFT owners to build on the understanding of how they perceive the ownership of their NFTs. This will provide more insight into consumption patterns and acquisition of NFTs, which hints towards their ownership perception. Furthermore, conducting a comparative examination of ownership conceptions of various virtual and digital objects can also enrich the academic discussion. This can be accomplished by holding a focus group discussion with respondents who own different virtual and digital goods like online subscriptions, NFTs, and in-game items. This will increase understanding of how the ownership

notions of various online assets differ from each other and help recognize trends or patterns that emerge in online asset ownership. In my study, I briefly explored how, in the case of the digital economy, we have seen ownership move to access-based models (Morewedge, 2020, p. 200), which has brought various digital services to our fingertips (Ethereum, 2022). With greater immersiveness and decentralized apps powered by a blockchain (Ethereum, 2022), I suspect that we are likely to see the return of private legal ownership of goods recorded in a unified digital ledger in the form of NFTs in the web 3.0 era. A study building on the evolution of ownership models can further benefit the academic discourse. I recommend conducting this study through another textual analysis of literature and white paper reports by experts in the field, like virtual world creators and metaverse companies.

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Footnote

[1] The corpus of all 69 tweets utilized for analysis, as well as the primary and secondary coding steps employed can be accessed here: https://filesender.surf.nl/?s=download&token=5285d985-8f3c-4d39-9c1c-9afae566bbe4. The first sheet of the spreadsheet contains all the tweets, along with their respective authors and URLs. The second sheet contains the primary-level codes corresponding with the tweets. The third sheet shows secondary-level codes (antecedents of ownership) linked to primary-level codes.