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# Reader influence on the creation of transmedia science fiction: a participatory culture perspective

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The term “Participatory Culture” was first put forward by Henry Jenkins in the book *Text Poacher* with the aim of comparing participation and the bystander (Jenkins, 2015. Participatory culture in a networked era: a conversation on youth, learning, commerce, and politics. Polity Press, Cambridge, UK). The earliest example is the study of the cultural logic of fan groups (or “fan culture”). When it was later studied more extensively, it took on different meanings. It has greatly influenced novels in the cross-media creative environment, and this has not only helped to expand the imagination and inspiration of authors but has also enriched novel plots. It can also increase audience participation and reading enthusiasm. This paper takes China’s science fiction transmedia as its example to analyze the significance and role of Participatory Culture, and it does this with the intention of helping to provide suggestions for the development of transmedia fictions.

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Transmedia fictions are stories that are typically disseminated across at least two different media platforms. The different modes of consumption each contribute something different to the overall story world (Jenkins, 2008, pp. 97–98). Frequently, these kinds of texts evolve into whole franchises, incorporating whole story universes, such as *Star Wars* (Jenkins, 2008). In China, web fiction, much of which might be considered transmedia fiction, has developed over more than two decades. Web fiction generally refers to works of literature that are mainly written to be accessed via the Internet. In China, *wǎngwén*, which can be literally translated as “web literature”, is primarily user-generated fiction in various genres, such as science fiction, that is commonly “serialized on online platforms where users write, publish, read, and interact with each other”, with them being “typically curated according to genres, subgenres, and gender orientations” (Zhao, 2022).

As noted above, as Chinese online novel websites have evolved, it has become commonplace for novels to be serialized. More than this, they are also often played as audiobooks. Many readers have come to prefer to listen to each serialization of the novel with friends or family, rather than reading it by themselves (Li, 2016). As a result, many websites enable the consumption of novels in a fashion more akin to a series of podcasts (Guo, 2022). On top of this, many of the novels available on the websites have been adapted into comics, movies, TV series, games, etc., and co-disseminated across different platforms (Lugg, 2011). It is for this reason that the texts in this paper are being described as transmedia fictions, rather than simply network novels.

Over the course of their development, the creative mode of transmedia fictions has been constantly improved and perfected. This brand-new mode has contributed unique creative and textual features to transmedia fictions, of which the role and embodiment of Participatory Culture in the creation of transmedia fictions is one of the most important. This is also one of the important features that distinguish transmedia fictions from traditional novels. In the book *Confronting the Challenges of a Participatory Culture* (2007), Jenkins defines participatory culture in the following way:

A participatory culture is a culture with relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one’s creations, and some type of informal mentorship whereby what is known by the most experienced is passed along to novices. [...] Members firmly believe that what they give is important, and they can feel a certain degree of social connection in the process of participation.

This strongly captures the sense in which the contributors to online science fiction websites in China—readers and authors—engage with their content.

China’s transmedia fictions began to develop in the 1990s. Overseas students initially exchanged and interacted through social media such as BBS and blogs to express their love of, and attachment to, the motherland (Xu, 2012). At this time, transmedia fictions were short in length, and more closely resembled diaries or essays, so they could not legitimately be called novels. Alongside this, readers did not participate in the creation of the novel, with the partial exception of the comment section of the article.

In 2000, Cai Zhiheng, a writer from Taiwan Province, China, took the lead in publishing the novel *The First Close Contact* on the Internet, which initiated public engagement and participation. As a result, the creative process of China’s transmedia fictions began to change. Serial novels gradually replaced diaries, essays, short stories, and other stylistic forms, and became the main component of transmedia fictions. However, at this time, the

function of the novel website was not perfect, as it was only possible to read online, but can’t communicate with the author.

However, as science and technology began to develop around 2004, and novel websites such as Huanjianshumeng, Qidian and Rongshuxia began to appear, readers gained an opportunity to participate in the creation of works. At present, there are more than 120,000 science fiction novels serialized on Qidian, and the number is still increasing. According to the 49th *China Internet Development Statistical Report* of the Chinese Academy of Sciences, “From 2016 to 2021, the number of authors of science fiction novels on Qidian Chinese website increased by 189% to 515,000; more than 22% of top writers have created science fiction works” (Chinese Academy of Sciences, 2022).

The readers on websites such as Qidian have, amongst other things, been able to participate in the creation of works by leaving messages in the novel comment area, interact with authors, discuss the plot development in topic groups, and reward authors with virtual coins. Transmedia fictions is a serial mode, and so reader participation in the creation of the work will have an important impact on the work’s content development. In seeking to enhance the popularity of their work, authors of transmedia fictions need to cater to reader opinions, which conceivably gives them great influence over authors and the process of creating transmedia fictions.

The consumers of online science fiction of this kind differ from the consumers of traditional print media in a number of important ways. Readers of traditional novels can only read works published on paper, so they cannot have an impact on the novel during its creation; they are only passive recipients, largely accepting what they are supplied. Of course, after a work is published, the readers of traditional novels may not like it and give it a negative evaluation, but this has no impact on the published content of the work. Readers of transmedia novels, however, can actively participate in the creation of the work during the writing process, and can thus influence its progress and even the ending of the whole work through their interaction with the author. Overall, the consumption behavior of readers of transmedia novels occurs earlier in the production process, is more active, more visible, and typically happens at a larger scale (Boni, 2017). This, in a sense, therefore, enables them to exert more power over the producers of fiction of this kind (Tian and Adorjan, 2016) and this is reflected in the way in which the online platforms themselves ‘promote’ (or don’t) the authors (Freeman, 2014). An alternative argument, however, would have it that this model makes authors more accountable and less authoritarian in their decision-making, with concomitant benefits in terms of such works becoming what might be considered more ‘collective’ productions, or, as Jenkins expressed it, the “coordinated authorial design of integrated elements” (Jenkins, 2010). Thus, in line with Jenkins’ notions of participatory culture (Jenkins, 2007), the subjective position of readers and writers has become more equalized, with readers becoming more ‘empowered’ and confident about the value of their contribution and authors coming to see themselves more as members of a broad creative community of practice (Wenger, 1998), with ‘expression’ (Jenkins, 2009) as its central goal.

The veritable explosion in the online production of fiction in China and the accompanying fan-based phenomena have provoked significant academic interest. One body of work here has explored the implications of the boom for the changing quality and nature of literary output (Huang, 2014; Lu, 2016; Machajek, 2021; Tian, 2019; Feng, 2022). Studies here have notably focused on the portrayal of men and women in online fiction and its implications for gender relations in China (Chen, 2017; Wang and Zhao, 2022; Xu and Yang, 2013; Yanjun, 2008; Zhou, 2021). Some studies have also focused specifically on the transmedia

characteristics of online fiction and its relation to other media, such as games (Inwood, 2014). Other studies have explored the economic implications of this new form of literary production in relation to Chinese socialism (He et al., 2022) and, alongside this, questions have been raised about what it might mean for the future of print media (Zhu, 2020).

Together with the interest in the production of online fiction, studies of fandom and its social effects have also featured strongly (Huang, 2022; Sauro, 2017; Yin and Xie, 2021; Zheng, 2016). A prominent vein in this body of work again relates to how matters of both gender and eroticism have played out in Chinese online fan communities (Guo and Evans, 2020; Li, 2022; Madill and Zhao, 2021; Zhang, 2016). Another concern relates to the effects of censorship on fandom and how it has generated a rather fluid online media landscape (Luo and Li, 2022; Ren, 2020; Wang and Ge, 2022; Zheng, 2019). Against this, some work has explored how online literature fandom can serve as a motivating force for nationalism in China (Liao et al., 2022). Interestingly for the work presented here, some studies of fandom have focused on the potential for fans to ply pressure on online authors and ‘coerce’ them to produce particular kinds of novels (Tian and Adorjan, 2016). Against this, some work has explored the extent to which fans of online fiction might be obliged to undertake a form of ‘data labor’ as a result of the algorithms platforms are choosing to use (Yin, 2020).

Within the above literature, a range of studies have looked more specifically at the development of web-based Chinese science fiction. Many of these have focused on the unique character of online Chinese science fiction (Song, 2013) and how it differs from Western science fiction (Li, 2015). In relation to this, a particular interest has been taken in how the explosion of web-based science fiction in China has repositioned Chinese science fiction on the world stage (Chau, 2018; Csicsery-Ronay, 2012; Hartley, 2022). Other work has explored the way in which the web has played a role in the growing commercialization of science fiction in China (Han, 2022). Within this, certain studies have looked at the demographic character of the readers of Chinese web-based science fiction (Feng, 2009). Beyond this, some studies have been concerned with how the move to consuming genres such as science fiction through internet-based media has had an impact upon more traditional print-based media (Yang, 2010). Closer to the interests of this paper, some studies have focused upon the uniquely participatory character of the involvement of fans in the consumption and production of science fiction on the web in China (Tang et al., 2022; Yang, 2021), including the impact on this on the reworking of traditional literary tropes (Ni, 2018; Tian, 2015). This has been accompanied by some studies that see the growing number of readers who become producers of literature in China, including science fiction, to be a concrete example of what has been termed prosumption (Chao, 2013). At the same time, confronted with the repurposing of themes in this literature and its increasingly transmedia characteristics, another body of work has been concerned with the difficulties that therefore arise with the copyrighting of content (Hickey, 2015), echoing broader concerns in studies of online fiction (Ren and Montgomery, 2012).

Alongside the above, certain studies have taken an interest in how readers’ wider concerns with the nature of the current world, such as climate change or civil breakdown, maybe having a shaping influence upon the kind of science fiction being published on the web (Imbach, 2021; Li, 2018; Møller-Olsen, 2020; Tian, 2019). This had led to some authors suggesting that the participatory character of this kind of online fiction has actually served to ‘reinvigorate literary creativity’ (Lugg, 2011) and ‘narrative innovation’ (Feng, 2015) in China. Some of these studies (e.g., Li, 2018) have noted the transmedia character of much of

the Chinese science fiction appearing on the web (Feng, 2015) and the important role being played by readers within this. However, these studies have tended to gloss over the nature of the relationship between authors and readers in this world and the way participation may have an impact on that relationship over the course of a story’s production.

This paper aims to fill the existing research gap discussed above by providing a comprehensive examination of the role played by readers in the generation of Chinese transmedia science fiction. In the process of reading transmedia fictions, readers actively engage with the author, leaving messages, comments, and participating in various forms of cultural involvement that directly influence the novel’s creation process. This departure from the traditional model, where novels were only read after completion by the author, highlights the active participation of transmedia novel readers in the creative process and production. To investigate the nature of this engagement, this paper will draw upon Jenkins’s theory of Participatory Culture, as outlined earlier.

Participatory culture, initially associated with fan culture, has evolved to encompass a range of connotations through extensive research. In this process, participants can derive spiritual satisfaction, and the low barrier to entry provides strong support for personal creation and sharing. Jenkins (2009) has identified several forms of participatory culture that are relevant to our exploration. These forms include ‘affiliations’, which involve membership in online communities centered around specific types of media, often social media platforms. ‘Expressions’ refer to participation centered around creative outputs, ‘collaborative problem solving’ involves teamwork to resolve issues and complete tasks, and ‘circulations’ relate to shaping the flow of media, such as podcasting and blogging. Notably, these forms of participatory culture resonate with the production of transmedia science fiction on the web. Consumers of specific science fiction genres can be considered online communities in their own right, working together with authors to shape plot developments. In addition, the transmedia nature of web fiction consumption, often through audio formats, aligns with the concept of circulations.

Examining how readers employ teamwork to affect the author’s writing process plays a critical role in exploring the influence of readers on the production of transmedia fictions. Analysis of the collaborative dynamics between authors and readers provides insights into the extent of reader involvement and its impacts on the creative aspects of transmedia science fiction.

By examining the multifaceted interactions within the participatory culture and its specific forms in the context of transmedia science fiction, this paper attempts to provide a comprehensive understanding of the reader’s influence on novel creation. This exploration will contribute to the existing knowledge and shed light on the dynamics between authors and readers in the realm of Chinese transmedia science fiction.

Participatory culture is a concept that has infiltrated and helped to shape a number of influential academic debates in a wide variety of different domains, including media studies (Burgess, 2008; Dena, 2008; Langlois, 2013), journalism (Deuze, 2006), heritage studies (Giaccardi, 2012), Human-Computer Interaction (Rotman et al. 2011), linguistics (Androutsopoulos, 2013), marketing (Guschwan, 2012), and even public relations (Tombleson and Wolf, 2017). One domain that has particularly concerned itself with the concept is education, where the increasing involvement of young people in participatory cultures of various kinds is seen to be giving rise to some significant challenges for educators (Ondrejka, 2008; Reilly, 2009; Tobias, 2013; Waldron et al., 2018). These include what has been termed the ‘participation gap’, where people have unequal access to the resources and knowledge around which participatory cultures are being framed, leading to potential disadvantages in life; ‘the

transparency problem', which refers to the difficulty people may have with identifying how different media may be shaping their perceptions and understanding; and, unsurprisingly, 'ethics', because people are increasingly taking on public roles through the participatory production of online media for which they are wholly unprepared (Jenkins, 2009).

Regardless of the domain, participatory culture can be characterized by certain fundamental features, as identified by Jenkins (2007): (1) participants can easily express themselves artistically and engage in the culture; (2) participants who create and share their creations receive 'strong support'; (3) more experienced participants typically pass their knowledge on to those with less experience; (4) participants are deeply invested in the validity and value of their own contributions; and (5) participation fosters the participants a sense of social connection among participants.

Within the context of this study, thoroughly exploring the concept of participatory culture requires the examination of whether the novel readers, who are the participants in this research, received 'strong support.' This examination, in turn, needs to analyze the nature and measure the extent of the support provided to them during the novel creation process. In addition, investigating the readers' social connections (e.g., their communication, discussion, and evaluation activities) will provide valuable insights into the dynamics of their participation and the impact on cross-media creation.

Due to the vital role of novel readers in cross-media creation, exploring their behaviors and involvement is critical within the framework of participatory culture. Readers offer a crucial aspect of popular culture, and their broad participation has emerged as one of the most prominent features of transmedia fictions.

This paper focuses specifically on popular science fiction online transmedia fictions, all of which were simultaneously made available across multiple platforms, including novel websites, such as audio novels, movies, TV series, animations, comics, and games. The paper uses a Participatory Culture approach to analyze the influence of their readers on the authors of such works when creating them. In doing so, it engages with novel themes and texts and puts forward new suggestions for the creation of transmedia fictions.

Ultimately, the argument here is that Chinese transmedia science fiction not only offers a form of relaxation to young people (Qin, 2007) that simply constitutes a new literary form (Xu et al., 2022) but also stands as a new form of communication and learning. There is a strong sense of participation in transmedia fictions that exists not only between readers and authors but also between readers and readers. This interaction helps readers learn and increases their motivation (Gilardi and Reid, 2011). With its potential for engagement, communication, and learning, transmedia science fiction can make a unique contribution to both the evolution of new media and the field of literary creation. As illustrated below, it may even be used to enhance readers' popular cultural competence.

### Reader influence on the theme characteristics of transmedia fictions

The subject matter of transmedia fictions is very wide and includes oriental fantasy, science fiction, history, suspense, love, and martial arts. Each major category has several specific sub-categories. This variety of themes did not exist at the beginning, but instead emerged as a result of emerging reader requirements during the development of transmedia fictions, as part of a phenomenon known as genre fiction. Zhou Zhixiong (2014), a Chinese scholar, observes that 'genre fictions are mainly aimed at popular novels for entertainment purposes. Novels with the same theme and similar purport are naturally formed in the

development history of novels, and are classified into one category, forming the type of novels'.

For example, the large category of oriental fantasy is one of the earliest themes of China's transmedia fictions, and the most famous representative work in the early days is Xiao Ding's "*Zhu Xian*" series is one of the most well-known representative examples. This type of theme, inspired by Chinese myths and legends, comes endowed with China's characteristics. After its great success, it was followed by many imitators, and a large number of transmedia fictions about China's myths and legends were produced in these years. These novels cite different mythological backgrounds and are divided into small types on the basis of individual detail, including traditional Xianxia and the fantasy cultivation of immortals. These small types emerged in response to different reading needs—while authors must quote different myths and legends when constructing the writing background of their novels, they all fall within the broad category of oriental fantasy.

As the landscape of transmedia fiction continues to expand, readers have shown a growing dissatisfaction with traditional notions of esthetic quality. They aspire for transmedia fiction to break free from the constraints of myths and legends, and embrace a broader, more diverse range of works. This shift in reader expectations has prompted novel authors to seek timely feedback from readers and embark on innovative approaches. Simultaneously, many readers themselves have ventured into creating their own works (Xu et al., 2022). Although some initial attempts may have resulted in failures, they marked the emergence of a new sub-category known as Oriental Fantasy within transmedia fiction, signifying a fresh beginning. This transition clearly exemplifies the unfolding of a nascent participatory culture.

One notable aspect of this phenomenon is the readers' uninhibited expression of their artistic viewpoints. Additionally, readers have gained the confidence to engage in their own creative endeavors and anticipate support from others within the platform. Remarkably, when viewed through the lens of participatory culture, we observe that the 'guidance' shaping this transition stems not only from the authors but also significantly from the readers. Although the readers may not possess the same level of writing expertise as the authors, they are, in a sense, 'experts' in online popular culture and possess valuable insights into what constitutes a 'good' contribution. This pivotal moment reshapes the dynamics of the author-reader relationship, with a substantial degree of authority in the writing process being delegated to the readers.

Establishing a stronger connection between the arguments presented and the supporting evidence requires gathering relevant data that substantiates the relationship between the emergence of new sub-categories of transmedia fiction, such as Oriental Fantasy, and the production of fan fiction by readers. By conducting empirical research and analyzing data on reader engagement and author-reader interactions within these contexts, we can provide robust evidence to support the described developments and their impact on the author-reader relationship.

By thoroughly examining the evolving dynamics of participatory culture within the realm of transmedia fiction, this paper seeks to shed light on the interplay between readers and authors. Through a combination of empirical evidence and theoretical analysis, we aim to provide a comprehensive understanding of the transformation occurring in the creation and reception of transmedia fiction, thereby enriching the current knowledge in this field.

The main difference between this evolving sub-category and its counterparts is that, although its framework quotes some traditional myths and legends, it is a new world that writers have

drawn on reader opinions to conceive and develop. This “new world” is at the core of the whole novel and is key to attracting readers. Again, in a spirit of participatory culture, readers constantly put forward opinions about this “new world” in the process of novel creation, which helps the author to constantly improve the world’s setting, resulting in a novel that is very popular with readers. Representative works include Tiancantudou’s *Fights Break Sphere*, Wochixihongshi’s *The Heroic Age*, and Mengrushenji’s *Yang Shen*, which are all famous transmedia fiction in China.

In addition to oriental fantasy novels, transmedia fiction with science fiction themes has also emerged as an important representative of China’s transmedia fiction. These are the type of novels that this paper focuses on. We should first acknowledge that science fiction is not easy to define. Most scholars tend to subscribe broadly to the definition first offered by Darko Suvin (1988), where he observes that: “Science fiction is a literary type or language organization. Its necessary and sufficient condition lies in the presence and interaction between alienation and cognition. Its main strategy is to replace the imagination framework of the author’s experience environment.”

Suvin believes that science fiction is an attempt to understand the living state of human beings from a new perspective in an unfamiliar world, or as Howell puts it, where “reality is “made strange” in light of a single fantastic premise” (Howell, 1994, p. 3). Spiegel (2008) expresses this, if anything more broadly, as a matter of ‘estrangement’.

On the basis of Suvin’s theory, science fiction can be roughly divided into three categories on the basis of different ways of treating science and technology, specifically popular, constructive, and speculative science fiction (Nicholls et al., 1999). Popular science fiction regards the novel as a popular science reading material and integrates a lot of scientific knowledge into the novel, with the aim of popularizing it. This genre is not a complete science fiction but more closely resembles a popular publication, and so does not have a large audience.

Constructive science fiction is based on existing scientific knowledge and constructs an ‘unreal’ new world. Its objects of reference are unlikely to exist in the real world at present, but which could, through future innovations, conceivably exist in the future, whether as a result of human or robot endeavors. This type of science fiction does not describe individual human beings, but rather the whole society. It can often satisfy readers’ fantasies about the future, and it appeals enormously to them for this reason.

Speculative science fiction mainly depicts the individual and future impacts of future world changes. It can be imagined in the past, the future, or some distant space, and its key preoccupation is often the benefits or dangers of scientific progress or technological change for human civilization. The book will engage with each of these variations of science fiction by drawing on a range of insights, experiences and perspectives that show the influence of scientific facts and methods on human beings and the possible impact of future changes in the world, and in this respect, the book will therefore effectively function as a warning to the future world. Contemporary readers will gain some enlightenment about the world that future generations will inherit.

Other authors have proposed a rather different kind of typology of science fiction. Roberts (2016), for instance, suggests that it has three basic forms: “stories of travel through space (to other worlds, planets, stars); stories of travel through time (into the past or into the future); and stories of imaginary technologies (machinery, robots, computers, cyborgs and cyberculture)” (Roberts, 2016). He also allows that utopian fiction may count as a fourth form, though with quite distinct antecedents in philosophy and social theory.

When China’s transmedia science fiction novels are assessed from a content perspective, they might generally be seen to be, in

Suvin’s terms, constructive and speculative. However, transmedia science fiction has tended to absorb certain characteristics from other genres to supplement its own deficiencies and make the content more vivid. Thus, it is not just science fiction, but consists instead of comprehensive novels flavored with oriental fantasy or western magic colors. Nonetheless, these novels are broadly recognized by their readers as science fiction and are referred to in those terms. Transmedia science fiction was originally based on famous science fiction movies, such as *The Matrix* and *Star Wars*. However, readers began to tire of this form. There are relatively few famous science fiction movies and too much repetition is not conducive to a positive reading experience. This led to the addition of other elements, though the core remains science fiction. This change was driven partially by readers, who suggested creating new science fiction content that engaged with different themes such as eschatological crisis, time travel and/or mechanized warfare. Here one can again see the ways in which the production of transmedia science fiction was evolving into a clear participatory culture. Many authors engaged with these and other themes, and this quickly established China’s science fiction transmedia as the most popular novel type among readers. Representative works from this genre include *Lord of the Mysteries*, *Swallowed Star* and *Spare Me Great Lord*. Each one has risen to the top of qidian’s annual bestseller list.

Many small novel categories, including campus, military, and urban love novels, have been absorbed into large categories. History novels include fantasy and overhead history.

These small classifications have gradually been improved by drawing on reader preferences. This too shows the participatory nature of reader involvement in the development of themes in China’s transmedia fiction. Amidst fierce competition, only those novel themes that meet reader reading requirements will persevere and further develop. Authors must therefore cater to readers’ preferences when choosing the theme of transmedia fiction. A novel that is popular with readers will create more hits and subscriptions than niche/unpopular novels. Writers of transmedia fiction who are mainly focused on making profits will prioritize click and subscription volume. If neither is engaged and acknowledged, income will be greatly reduced. Reader preferences can determine the theme of transmedia fiction, which is a writing feature that traditional novels lack.

Undoubtedly, some transmedia fictions authors operate on a ‘not-for-profit’ basis. Their style is not aligned with current mainstream aesthetics or reading needs, and so it is difficult for their work to be popularized among readers of transmedia fictions. Their work is basically unable to obtain benefits and is even disregarded for long periods of time.

### Reader influence on the textual characteristics of transmedia fictions

In addition to the theme, the textual features of transmedia fictions are also very important. In contrast to traditional novels, transmedia fictions have a low writing threshold and a wide audience, meaning their text requirements are not as strict as those of traditional novels. In the case of transmedia fictions, the click-through rate of free reading chapters is very important, and only books with a sufficiently high click-through rate can guarantee sufficient subscriptions for the novel’s paid reading chapters. Writers of transmedia fiction like the subscription ratio to be kept at around 100:1 in order to ensure their profit. Authors who wish to obtain more income from transmedia fictions must have more subscriptions. If the author wants more subscriptions, they must have a higher click-through rate. Transmedia fictions need to be unique in the text, as this will attract more readers.

If transmedia fiction wants to attract readers' attention, it must have novel content, and this is why novelty has emerged as the most prominent textual feature of transmedia fiction. The novelty of transmedia fiction is first manifested in the diversity of its contents. Western magic, oriental fantasy, suspense, and history are among the different transmedia themes. These themes often have different esthetic advantages that can be adjusted to specific reader needs and preferences.

However, science fiction novels are slightly different because they often combine the esthetic features of other subjects with science fiction elements, which forms a brand-new imaginary space packed with incredible novelty (Liu, 2016). Mecha-type transmedia science fiction includes *Armed Storm*, *Tales of Teachers and Scholars* and *Seeing and Hearing of Abnormal Creatures*<sup>1</sup>. These novels are classic works that combine science fiction with other elements. Consider the example of *Armed Storm*, which is set in a future society's big space age. Nuclear energy, spacecraft, superconducting equipment, ion equipment, cloning technology and other cutting-edge science and technology all make an appearance. The book hero accidentally gets an intelligent mecha and this, in addition to other technological elements, proves to be his main source of reliance. However, in the process of his growth, both his own level of promotion and combat experience are invested with fantasy and magic. For example, the book refers to China mythology, magic in western mythology and brings technology and magic together. *The Record of Abnormal Creatures* combines science fiction with western magic and a distinctive cast of characters. The hero is a mixed-heritage demon hunter, and the heroines are a vampire and werewolf. The book focuses on the struggle between the demon hunters and other heritage groups. It does not only depict the technological development of the demon hunters but also refers to the magical skills of other heritage groups, and this combination of reality and fantasy cultivates readers' imagination.

Transmedia fictions also have utopian narration characteristics, which is commonplace throughout Chinese science fiction (Song, 2013). This feature is closely related to reality. Robert Scholes (2011) observes:

“The expression of this utopian impulse has been as close to the real world as possible, but it has not turned into some conscious utopian conception, nor has it entered the development track of another utopian plan and realization that we call.”

From this perspective, transmedia science fiction does not seek to establish a science fiction world different from the real world; instead, the author uses science fiction imagination to express dissatisfaction with contemporary real society, on terms “as close as possible to the real world”. This feature is shown in some transmedia science fictions of the upgrade type.

For example, the writer Huishuohuadezhouzi established a different life circle on earth in the book “*Spare Me Great Lord*”. In this book, people on Earth can improve their force value through cultivation, and their social status is ranked in accordance with their individual force value. The higher the force value, the higher the social status. Although the book is fictional, it strongly resonates with readers because the fictional scenes share many similarities with real society. To take a few examples, grades are divided in accordance with academic achievements in schools; there is a strict superior-subordinate relationship in government agencies; and seniority produces a number of advantages in the company environment. These realities are invoked in the virtual society, and the parallels resonate with readers. In the comment area of the novel “*Spare Me Great Lord*”, many readers said as much, which confirms the novel content resonated with readers. In this fictional world, the hero still has to fight for his family,

compete and cooperate with friends, grow up silently, and finally experience a happy ending with the heroine. Although this kind of thinking is somewhat old-fashioned, it is the ideal life that most readers have pursued their whole lives, and so it is very popular. The reflections engaged in by readers through their discussion of these kinds of texts also push forward their own understanding of the interrelationships between the novel of this kind and society. In this way, readers are actively learning from one another about their own culture.

Readers of transmedia fictions often substitute themselves for the book protagonist when reading. This means they don't like the protagonist to suffer too many hardships; they hope he/she will be able to turn the corner smoothly when encountering difficulties and will fight back strongly when looked down on by others. Their desire in these regards is further strengthened when they experience similar things in their own lives but are unable to solve them easily. The utopian content of transmedia fictions is therefore their spiritual sustenance. This is different from the dystopian themes that often preoccupy traditional science fiction. Transmedia science fiction is therefore more predisposed to describe the hero's omnipotence through unrestrained fantasy, as this will produce an extraordinary transcendence of the author's personal life and an imaginary reproduction of their real life. This utopianism of individual narrative is not just an expression of the author's personal imagination but is also a figurative embodiment of readers' wishes. Science fiction transmedia novels most frequently seek to create a social environment that science and technology could achieve in the future, upgrade real life to a certain degree, and place the hero in a large background, in a manner similar to the cultivation game that starts a new story. This kind of individual narrative utopia routine evokes the deep love of readers (not just of science fiction but also of transmedia fictions that deploy similar routines). Here too, the online discussions about these fictions provide readers with an opportunity to reflect on one another's aspirations and hopes, for themselves and for society, helping them to develop a more nuanced grasp of one another's perspectives. The grounding of these narratives in recognizable aspects of people's everyday lives, while reconfiguring them into something ‘better’ resonates with the work of Jameson on utopias and their ultimate purpose (Jameson, 1979, 2004, 2005, 2010). Indeed, the use of highly familiar routines to accomplish the narrative reinforces this point. As Wegner (1998) puts it:

“Jameson (1987) now suggests that the “object of representation” in a Utopian text may never have been the “realm of freedom” that would exist in a radically other society... Rather, Jameson now asks us to consider the possibility that what the Utopia successfully brings into view is precisely the “machinery” concentrating and localizing necessity - those structures that enable a social order to (re)produce itself - so that new forms and spaces of freedom can come into being in the first place” (Wegner, 1998, p. 70).

We can also see in these traces of the levelling and creative aspirations of a participatory culture in the making.

Transmedia science fictions are different from traditional science fiction novels that deal with the relationship between fantasy and technology. Traditional science fiction novels will consciously limit their imagination, while science fiction transmedia fictions tend to be more arbitrary, which is due to their great freedom on the network platform. This kind of freewheeling not only reflects the author's ability but also the fact that, in the process of transmedia fiction creation, readers can actively participate in the creative process by engaging through the network platform. It has already been noted that China's transmedia science fictions are

generally constructive and speculative. However, there are some subtle differences between the two types when they deal with the relationship between fantasy and technology.

Looking now to speculative transmedia science fiction, this kind of fiction speculates on the possible impact of changes in science and technology on human beings and embodies the author's own thinking about real life in the illusory world. Liu Yuan (2016) refers to the reflections of scholars on *The Guest* and notes how they observe “the author trickily weaves complex science fiction stories in the net of philosophical thinking, which conveys his cognition of Kant's ethical concept and his view of the real world”.

This describes the conflict between the Federation and Empire civilizations, and the ensuing scenes are responses to reality. In his 2009 novel, Mao (2009) writes:

The imperial rulers, regardless of the life of the people at the bottom, devoted all their efforts to make the strongest space travel technology and spent countless funds to study warships and weapons, just to satisfy the vanity of the royal family. There are federal presidents, houses of parliament, seven big families, and supreme justices. These upper classes are all corrupt, but the lives of ordinary people seem to be good.

These situations broadly approximate to past history and resonate with readers for this reason. After foreshadowing the whole book's plot and constantly communicating with readers, the author offers his conclusion on what kind of society that is best suited to human development. He observes:

Although the corruption at the top of the empire is no different from the erosion of the seven members of the Federation, I still prefer a world where everyone in the Federation has dignity. Even if this dignity is only superficial, it is better than nothing.

The constructive transmedia science fiction is therefore different. Although it constructs a world different from reality, some assumptions of this world can be traced and are based on modern technology or reasonable scientific conjecture. This kind of work requires the author to be highly conscious, to control fantasy in an appropriate range, and so on. This appropriate range is based on the relationship between the fantasy world and existing technology. If it exceeds this range, the novel will become an oriental fantasy or western fantasy. But if it falls beneath the bottom line of this range, it will not be sufficiently imaginative to sustain the readers' interest. With regard to thinking about the universe, traditional science fiction is described in accordance with existing scientific knowledge of human beings. For example, consider the surpassing of the speed of light—traditional science fiction avoids this question entirely or instead seeks to explain it by drawing on the known scientific concept of a wormhole. However, in the book *Dark Blood Age*, read by readers across the world, a different explanation emerges. Here the author uses philosophical thinking to create concepts such as a zero-dimension node and rainbow bridge. He (Tianxia, 2010) observes:

Zero dimension has no size or distance. When zero dimension is connected with the multidimensional material world, or there is a time axis, zero dimension has meaning, and human consciousness exists with zero dimension. Also, a node exists between the smallest scale of time and space, between existence and nonexistence. When someone observes it, it has meaning, and the world inside is real. When you leave it, it doesn't mean anything.

In engaging with these settings, readers can communicate regardless of the distance limit, invade the consciousness of others

at will, and realize the figuration of self-consciousness. This all serves to take forward their understanding of the culture they inhabit and the way it operates. The author of *Dark Blood Age* observes that ‘consciousness is pinned on the zero-dimensional space, and it can acquire the ability of superluminal, which is not superluminal in the material sense, so it conforms to the special theory of relativity’.

Readers can easily identify that these seemingly bizarre settings have a certain philosophical rationality and scientific logic. Many fans will supplement and improve them in the comment section, and this will take precedence over the author answering other people's questions. This will in turn help to ensure the book's ‘scientific’ credentials. In this kind of context, readers of science fiction transmedia fictions are actively educating one another about philosophy and science and building up a greater competence about these matters within their online community.

The text of transmedia fictions also has the characteristic of labeling, which is given by readers. The continuous integration of the themes of transmedia fictions means that it difficult to reflect innovation in novels by solely classifying them on this basis, and this is why transmedia fictions will use “labels” for auxiliary classification. Consider the example of Qidian, the largest website in China. In its science fiction novels, there are more than 20 kinds of auxiliary labels, including giants, secret agents, summoning, invincible, and transformation. The function of these labels is to mark the most common elements of works, and this can help readers quickly query them. The large number of transmedia fictions means there are thousands of novels in each category, even after subject matter classification. In order to enable readers to quickly find the novels they want to read and facilitate their reading; the author chooses or customizes some tags when uploading works on the network platform. These tags, in the same way as keywords, can notify readers of the characteristic content of novels in the shortest amount of time and are a convenient point of reference when querying the types of novel to read. Of course, from a marketing point of view, certain categories of novels may be particularly popular for a certain period of time and, if novels are added with corresponding category labels during this period, it will attract more readers and increase the number of paid readings. However, despite this marketing angle to the tagging practices adopted by websites, it remains the fact that they allow readers to quickly find the type of reading they like so that they do not need to spend too much time searching. Large categories, such as the science fiction genre, have many smaller category labels. These categories help readers to know the main elements of a science fiction novel in more detail, such as whether its genre is mecha, doomsday, future world, etc., so the primary function of these categories and tags is to facilitate reading.

For example, the transmedia science fiction novels *Natural Disaster* and *Dark Blood Age* both consider the doomsday crisis. In *Natural Disaster*, after the end of the world, Earth becomes a game world where human beings gain experience value by choosing different occupations and fighting with other heritage groups. When they gradually upgrade to a higher cosmic civilization, they are labeled “upgrade”. *Dark Blood Age* is about the world after the sun disappears, when it is sustained by dark matter and energy. This novel provides a detailed analysis of the concepts of space and time interval in the starry sky war and also provides insight into the advantages and disadvantages of the space-time deviation and information transmission deviation produced in this war. The author emphasizes the importance of technology in the space war. If humans lack technology, they will be unable to break through the dark matter world and will kill each other. And this is why it is labeled as “technology flow”.

As embodiments of grassroots culture, transmedia fictions have a low creative threshold which falls below products with higher artistic value thresholds, such as traditional novels. However, transmedia fictions can involve more people in an esthetic pursuit and elevate their individual understanding of popular culture. In other words, they bring with them an opportunity to learn about how popular culture operates. In the process of creating transmedia fictions, readers not only participate in the evaluation stage, but also directly intervene in the creative process, and even contribute to interactive writing. They consequently have an enormous influence on the text characteristics of transmedia fictions. The author is no longer the dominant figure in the construction and development of the text, and indeed the author and readers come together in a joint enterprise, from which everyone learns something.

### Reader influence on the creation of transmedia fictions

Reader influence on the creation of transmedia fictions can be divided into influence of readers before and during the creation of transmedia fictions. In the paper media age, traditional novel creation was a relatively independent process. Ordinary readers, as recipients of traditional novels, hardly had any direct impact on the process of novel creation. It is conceivable that adjustments may be made to the small number of works serialized in newspapers and magazines on the basis of their broad public appeal. However, overall reader influence during this era was likely to be negligible.

The professional critics and the literary editors of publishing houses exerted great influence on traditional novel creation in the paper media era. The former was entitled to speak on the evaluation of literary works in the paper media era, and the latter was able to decide if literary works were smoothly published. Before starting the writing process, the author will cater to and adjust creative content and style in accordance with established literary criticism at that time and the preferences of publishing houses' editors, and this will ensure the smooth publication of their work. However, in the online literature era, the appearance of the online platform establishes a clear communication channel between ordinary readers and novel writers, and it is more convenient for readers to participate in the evaluation of works, which greatly enhances their influence on the creation of transmedia fictions. In addition, not all transmedia fictions need to be published as physical books, and indeed most transmedia fictions are only published on the network platform, meaning that professional critics and publishers will have very little influence on the creation of transmedia fictions.

Instead, transmedia fiction writers now pay more attention to the opinions of ordinary readers. In seeking to gain more commercial benefits, they will cater to the preferences and esthetics of ordinary readers and create some novels with fixed routines. But this was not the case at the beginning of the rise of transmedia fictions. As Yang Xinmin (2000) observes:

Because the publication of traditional literature needs to be restricted by publications and editors, the authors of transmedia fictions only need to create and publish according to their own preferences, and they are completely free to be driven by the authentic 'I' to express freely and attract the same interests.

At this time, the market of transmedia fictions had not been perfected, and accordingly, its content mainly expressed the author's truest feelings and personal ideas.

However, as cultural capital entered transmedia fiction websites, transmedia gradually began transform into an industrial economy, meaning that the early free improvisation was no

longer the basis of the creative process. Transmedia fictions then gradually became a part of consumer culture and a kind of cultural good.

In traditional literary creation, the author of a novel presupposes a specific audience before creating a work. But if the preset readers of traditional novel writers are close friends that the author tries to locate on the basis of self-expression, the preset readers of online literature creators become the potential target customers of their products, which are mainly tailored to customer needs. In seeking to meet customer needs, many transmedia fiction writers will add a large number of routine elements to their works, resulting in an increasing number of works with similar plot settings that are increasingly indistinguishable from each other. This is an important contributing factor to the low literary value of transmedia fictions.

Jiangnan's *Dragon* series clearly demonstrates this. *Dragon I*, the first book gained broad reader attention across various platforms and was awarded high marks on them by reviewers. The exquisite world outlook setting, the plot's ups and downs and a passionate emotional catharsis drew extensive praise from readers, and the book was even once labeled as China's Harry Potter.

Young readers were deeply attracted to the book's young characters and youthful fantasies, and the comment area contained many encouraging reader messages and suggestions from readers and extensive reader-author communication. On the basis of the first book, the series looked likely to progress and further develop.

However, as a result of the success of *Dragon I*, the series' hidden commercial value was recognized and, as a result, a large amount of commercial capital was invested into it. Since *Dragon II*, the commercial elements of the series have gradually increased, and the plot has begun to resemble a Hollywood commercial film. This culminated in *Dragon III*, which was evenly divided into three volumes (the upper, middle, and lower) which were, in much the same way as toothpaste, sold in batches. The accumulation of this commercial content caused reader enthusiasm for the whole series to decline, and growing reader dissatisfaction was further exacerbated by delayed plot content. Readers responded to what they viewed as unreasonable plot settings by leaving messages in the book review area that expressed the hope the author would make changes. However, under the pressure of commercialization, these suggestions were ignored, and many readers now regarded the series with substantially diminished expectations. They expressed their disillusionment on a professional book review website, and the *Dragon IV* rating plummeted as a result. (Figs. 1 and 2).

Zhu Liyuan (2010), in reflecting on the "horizon of expectation" that has become part of modern literary theory, presents it as:

Readers' directional expectation of the way a work is presented before reading and understanding. This expectation has a relatively definite boundary, which defines the possible limit of understanding. Expectation has two forms. One is a narrow horizon of literary expectation formed on the basis of past esthetic experience (esthetic experience of a literary type, form, theme, style, and language); the Second, is a broader horizon of life expectation formed on the basis of past life experience (life experience of social and historical life). These two horizons blend with each other to form a specific reading horizon.

As an important form of online literature, transmedia fictions have a "horizon of expectation", and this concept perfectly encapsulates and embodies the need for transmedia fictions to gain knowledge and understanding of readers' needs in advance. Readers of transmedia fictions are first and foremost netizens who





Fig. 1 Dragon I score.



Fig. 2 Dragon IV score. The Fig. 1 is the Dragon I score, and the Fig. 2 is the Dragon IV score. The score has obviously decreased in the Fig. 2.

can skillfully use the Internet and have spare time. With regard to age, they are mainly young students, although other age groups should also be acknowledged and considered. With regard to academic qualifications they, from an early stage, possessed high academic qualifications, although this has gradually changed over time. Consider the example of China. The 44th China Internet Development Report (2019) observes that “in 2019, the number of online literature users has reached 455 million, and the usage rate of netizens has reached 53.2%, and it is still growing”. At present, more than half of China’s netizens in China use transmedia fictions, and this percentage is still increasing. This has produced the popularization of the reading interests and expectation horizons of transmedia fictions, as Guo (2009) acknowledges in observing that “online literature is moving from ‘elite reading’ to ‘civilian reading’”. The horizon of expectations held by readers of transmedia fiction directly influences novel content in the pre-creation stage. The science fiction transmedia fictions referenced in this paper look well-placed to become one of China’s most popular transmedia fictions because they meet readers’ expectations.

Despite the preceding analysis, it is important not to see the development of transmedia science fiction on the web as being simply about the production and consumption of cultural commodities. Readers, at first sight, are fans of the novels and, from the perspective of participatory culture, their behavior conforms to the definition of fan culture. However, in the process of a novel’s creation, the readers are not pure recipients, they can also export their own cultural context, and this ‘output’ can be accepted by the author. Thus, although the author is the main creator of the novel, he is not completely exporting his own cultural content. In many cases, readers’ comments bring the author new inspiration. Indeed, many authors of cross-media novels are also readers of other transmedia novels (Xu et al., 2022). In that case, readers are often inspiring their own creations when commenting on other works. Whole dialogs evolve between authors and readers as a novel progresses and authors need to persuade the readers to their own ideas, especially if the readers have questioned some of their plots. If an author does not choose to simply accommodate reader feedback, he must cleverly design his following output, so as to convince the readers to keep reading

his work. So, in transmedia science fiction novels, there is a high probability that the roles of readers and authors can be interchanged. They influence each other and, in a sense, achieve each other. Neither can stand without the other and they are themselves participatory creations. This repositioning of the role of 'reader' and the role of 'writer' in transmedia science fiction can be seen to resonate in a number of ways with Jenkins' notion of participatory culture (Jenkins, 2007), with both parties being involved in a mutual 'expressive' endeavor where no one party has absolute control (Jenkins, 2009).

Readers do not only influence the content of transmedia fictions before they are created but also play an important role in the creation process. In traditional novel creation, creation and evaluation are two different stages, with creation, being followed by evaluation. Readers' evaluation will form a series of texts after they finish, but this will basically not affect the texts created by authors. Transmedia fictions are different by virtue of the fact that they are published while being created, with creation and evaluation appearing as simultaneous parts of the writing process. Here reader feedback can directly affect the creation process of works and their content. Different readers actively participate in the evaluation of work, which results in different expectation horizons and esthetic experiences being taken into consideration. In the process of communication between the author and readers, the author may adjust the creative direction or even modify the previous text in response to different reader feedback and expectations. The volatility of popular culture is widely acknowledged (Beer, 2013). Amongst other things, we can therefore see in the relationship between authors and readers in Chinese transmedia science fiction elements of readers actively educating authors as to the current preferences of popular culture, so that authors can shape their output accordingly. This, too, resonates with the core precepts of a participatory culture.

The above points cannot be seen to align exactly with the various forms of reader response theory that are commonly posited in literary criticism, where the claim is that the meaning of any text is entirely dependent upon what the reader makes of it during the reading process and that a text may not be seen to exist in any meaningful way until a reader has engaged with it (Bleich, 1988; Fish, 1970; Holland, 1998; Rosenblatt, 1978). It does, however, resonate to some extent with the notion of 'interpretive communities' in social reader-response theory, where a shared interpretation can be seen to evolve amongst a particular community of readers of some specific text (Fish, 1980). There are various more nuanced versions of reader-response theory, especially in the area of reception esthetics (Jauss, 1982) and reception theory (Hall, 2003), where the point is still to acknowledge the active role played by the reader, but not to see this as entirely open-ended, but rather something that is shaped by a reader's cultural background, experiences, and esthetic preferences. Generally, the point being made in all of these theoretical perspectives is that the reader of a text is not simply passive but rather playing an active and creative role in how the text is consumed. This paper argues that, in the context of transmedia science fiction, the creative role being played by the reader reaches new heights, is inherently different from the consumption of traditional fiction, and is helping to reconfigure the nature of the relationship between authors and readers. Readers are now in a position to influence the esthetic outcomes of a text while it is being written, rather than simply at the point where the authors' work upon the text is, to all intents and purposes, finished. This, of course, can be seen to squarely align with Jenkins' notion of participatory culture (Jenkins, 2007), where the participants are generally able to express themselves creatively and engage, are widely supported in doing so, and are able to assert the merit of their own contributions.



Fig. 3 The comments sections of the novel "Madden Shooting Guard".

The following screenshots show the kinds of feedback authors receive from their readers via the comments sections on the websites (Figs. 3–5):

Writers of transmedia fictions often pay attention to these kinds of comments from readers. They also interact with their readers in the communication group and revise the textual content of their novels on the basis of the feedback they receive. This is the only way that they can see off the fierce competition confronting them in this publishing domain and ensure their work will remain competitive. The novel income and average subscription for VIP chapters provide the most intuitive basis for grasping the quality of transmedia fiction. In interviews with some writers of transmedia fiction, one writer named Han Yu said that when he first started writing, he experienced a period of low subscription. At this time, he didn't pay attention to his readers' opinions and did not interact with them, which clearly contributed to his poor performance. He later began to



Fig. 4 The comments sections of the novel "The Guest".

actively interact with readers who left messages in the comments section, discussing the plot's development, and taking reader suggestions into account when writing. This order of engagement clearly contributed to his later average subscription of more than 1000 chapters which was delivering him a good monthly income (Fig. 6).

To summarize, readers' horizons of expectation and esthetic experience will directly affect the creation of transmedia fictions by enabling active reader participation in comment evaluation. The creative process of transmedia fictions is inseparable from reader participation. Only those transmedia fictions that allow readers to actively participate in interaction, evaluation and discussion can aspire to success in the highly competitive online literature industry.

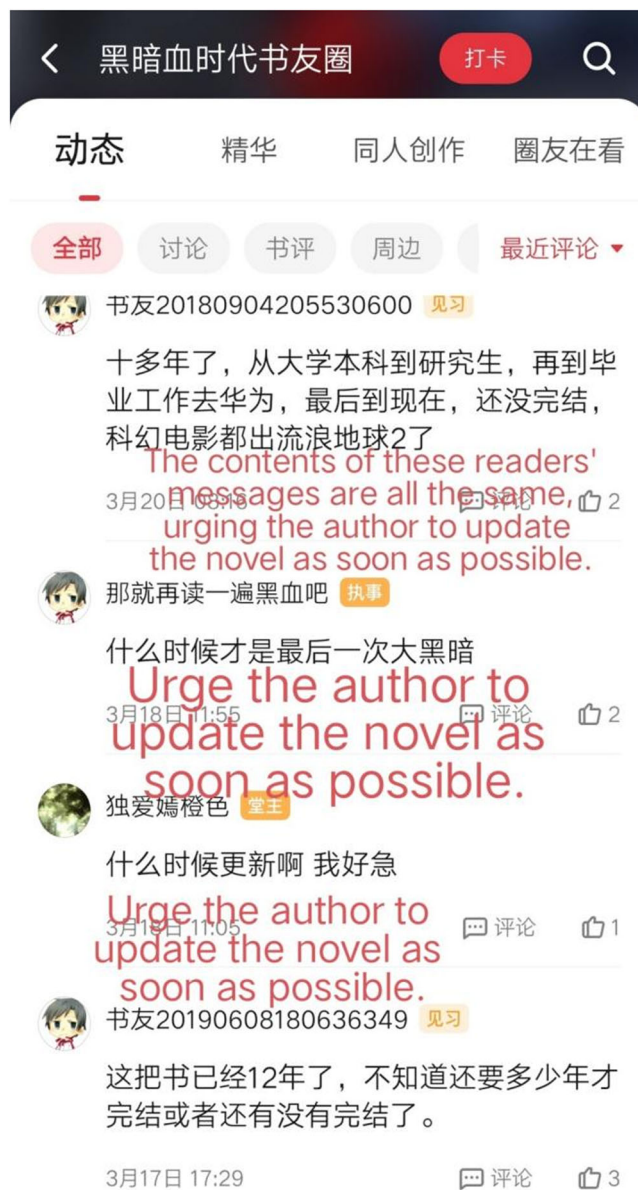


Fig. 5 The comments sections of the novel "Dark Blood Age".

**Conclusion**

In a 2022 interview, Abdulrazak Gurnah, winner of the 2021 Nobel Prize in Literature, in explaining why he writes, noted that "you are ready to write for the readers. At first, you don't know who is on the other side. But then you feel things that you see the necessity to tell".

This is a familiar feeling for transmedia fiction writers. Transmedia fictions are written for readers, who don't know the author. Through their work, the author expresses what they wish to express to readers, and readers in turn participate in the creation process by providing positive evaluation feedback, the most distinctive feature of transmedia fictions and the embodiment of Participatory Culture in the creation of transmedia fictions. The quality and reputation of transmedia fiction are all evaluated by readers, whose influence on the creation of transmedia fictions far exceeds that of professional critics and literary editors. But this will also create a clear problem in the form of a lack of esthetic accomplishment. After all, most readers are ordinary people. Although they actively participate in the creation



Fig. 6 Average subscription and monthly income of writer Han Yu.

of transmedia fictions, they will struggle to also contribute full literary and artistic value. Accordingly, in seeking to contribute to the further development of transmedia fictions, professional critics and literary editors should actively participate in the creative process and pass on their own experiences to readers and authors. From a participatory culture perspective, this will not only guide readers to read but will also provide positive guidance to the creation of transmedia fictions and improve the literary and artistic value of transmedia fictions.

As has been argued throughout this paper, fans can significantly affect not just the popularity of these kinds of novels, but also how they are created. A transmedia fiction that is particularly popular with fans, even if its literary value is not high, will get the attention of website editors, and editors will assign it additional web resources. For website editors, their criterion for selecting transmedia novels is whether they meet the tastes of online readers, rather than the comments of professional critics. Alongside this, at present, professional critics still don't pay a great deal of attention to transmedia novels and think that their literary value is slight. However, these opinions count for little in the success of transmedia science fiction and its reach.

Yet, it remains the case that professional critics could, indeed, play a role in improving the quality and literary value of transmedia novels. If professional critics and literary editors were to play a more active role in the creation of these novels, it would quite possibly have a knock-on effect by improving readers' literary literacy and esthetic capacities. For example, they could actively engage in discussion with readers via the comments pages for online novels, criticize ways in which the novels are using more hackneyed and formulaic routines, propose innovations in article conception, make suggestions regarding wording, and so on. This would help the readers to not only participate but learn. Professional critics and literary editors typically represent the traditional elite in literature, while

the readers and authors of transmedia science fiction novels tend to represent the grassroots. If these two currently disjoint communities can communicate with one another more actively in this way, it is very likely that many more novels that can satisfy both the elite and the grassroots will be born. It may also serve to promote a more concrete and formative relationship between the two, where each comes to understand that there are things of value to learn from the other.

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**Note**

1 Respectively, by Skeleton Elves, Fang Xiang, and Yuan Tong.

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### Author contributions

Han Xu is the only author involved in writing the manuscript. Professor Javier Gonzalez Patiño and Professor José Luis Linaza, these two authors revising it critically for important intellectual content, contributed equally to this work and jointly supervised this work.

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The authors declare no competing interests.

### Ethical approval

This article does not contain any studies with human participants performed by any of the authors.

### Informed consent

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### Additional information

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