Ludic stylistics: Narrating a thought experiment (A study of "The Science of Discworld" series)

Olena Tykhomyrova, Natalya Izotova*

Kyiv National Linguistic University, 03150 Kyiv, Ukraine

* Corresponding author: Natalya Izotova, natalya.izotova@knlu.edu.ua

ABSTRACT: This article addresses the phenomenon of ludic stylistics, viewed through the lens of interdiscursivity. The paper defines interdiscursivity as a narrative strategy that involves the blending of discourses of different types within a single literary text, thereby foregrounding its genre-bound nature. In the "The Science of Discworld" series, co-authored by Terry Pratchett along with the popular science writers Jack Cohen and Ian Stewart, interdiscursivity is evident through the fusion of fictional and non-fictional discourses. The interplay of these discourses in the "The Science of Discworld" series facilitates the creation of its ludic stylistics. The paper regards ludic stylistics as an artistic phenomenon that emerges in literary text at both the micro- and macro-levels due to unconventional combinations of linguistic units of any rank. These elements, whether independently or in tandem with other literary devices, have a tendency to engender singular or multiple ludic effects. Ludic microstylistics in the "The Science of Discworld" series is primarily manifested through the innovative combinations of various figures of speech, such as metaphors, personifications, antonomasia, analogies, neologisms, puns, irony, and more. Ludic macrostylistics is represented by narrative games, predominantly of metafictional and intertextual varieties. Overall, ludic stylistics constitutes the ontology of the "The Science of Discworld" series, while shedding light on the innovative transformations of genre-bound literary forms.

KEYWORDS: discourse; interdiscursivity; ludic stylistics; game; narrative; fantasy; science fiction

1. Introduction

In the realm of so-called post-classical narratology, there has been a strong trend to emphasize experimentalism in literary text with regard to its genre, language, structure and meaning (Bekhta et al., 2018; Bray, 2012). This shift in emphasis gives rise to unnatural, or unconventional narratives (Alber, 2011; Alber and Heinze, 2014; Richardson, 2011), aimed at reconsidering conventions of narrative writing through "breaking existing narrative conventions and innovating new narrative strategies." (Shang, 2019, p. 12). Unconventional narratives produce a defamiliarization of the basic elements of narrative (Richardson, 2011, p. 34), being experimental, extreme, transgressive, unconventional, nonconformist, or out of the ordinary (Alber and Heinze, 2014, p. 2–5).

In contemporary fiction, one of the effective ways to defamiliarize conventional literary forms is by experimenting with the mode of fictionality through numerous interdiscursive techniques. From a

linguistic perspective, interdiscursivity "refers to the mixing of genres, discourses, styles and other elements within a single text." (Wu, 2011, p. 97). It "is related to the whole language system involved in the text" (ibid.) and is concerned with the author's linguistic and stylistic choices. This paper defines interdiscursivity as a narrative strategy for text-building and meaning-making, manifested through various interdiscursive relations among elements of any rank.

Although the phenomenon of interdiscursivity has been extensively examined within the framework of discourse studies (Bhatia, 2010; Björk and Iyer, 2023; Fairclough, 1992, 2003), it has received scant attention in present-day linguistic and stylistic narratology. This research is designed to fill in lacunae in the genre-oriented approach to interdiscursivity, hypothesizing that it is the genre of fiction that determines the pragmatic effects brought about by the interaction of various interdiscursive elements within literary text.

"The Science of Discworld" series comprises four books written by Terry Pratchett together with the popular science writers Jack Cohen and Ian Stewart. According to the introduction to the first book, The Science of Discworld, the project offers a thought experiment: it juxtaposes scientific ideas from our world (called "Roundworld" in the texts) with the imaginary worldscape of Discworld, in which magic exists. The authors remark that, "We can look at science from outside" proceeding to assert that such thought experiments constitute a legitimate scientific procedure (The Science of Discworld, 2013, p. 11–13).

In the "The Science of Discworld" series, interdiscursivity reveals itself through the interaction of two types of discourse—fictional and non-fictional, which imparts a playful touch to the narrative, enabling the emergence of its ludic stylistics.

In broad terms, ludic stylistics is a heuristic concept that defines the ontology of contemporary art forms. It finds its manifestation in the semiotic diversity of cultural artifacts and illuminates the specificity of the modern artistic mindset.

From a linguistic perspective, ludic stylistics is thought of as an artistic phenomenon represented in literary text due to the unconventional combinations of various textual means (Izotova, 2021, 2022). The latter, either individually or jointly, tend to create singular or multiple ludic effects at the micro-and macrostylistic levels. Microstylistics comprises various verbal techniques used to generate ludic effects. In turn, macrostylistics encompasses plot-building and compositional devices, as well as the narrative representation of ludic stylistics. As the potential outcome(s) of language and narrative gaming, the ludic effect is embedded in literary text and manifested through a variety of ludic techniques (Izotova, 2021; Tykhomyrova, 2011, 2014).

The purpose of this paper is to explore verbal and narrative manifestations of ludic stylistics in the "The Science of Discworld" series through the prism of interdiscursivity, i.e., the combination of literary and non-literary types of discourse.

2. Materials and methods

The paper provides a comprehensive methodology for the study of verbal and narrative manifestations of ludic stylistics in the "The Science of Discworld" series. It is grounded in the cognitive theory of attention distribution in language and text (Logan, 1995; Marchetti et al., 2015; Talmy, 2007). The research identifies and examines verbal and narrative cues of ludic stylistics using the "nodal points" method (Izotova, 2021, 2022). Nodal points, in turn, are considered as stylistically conspicuous parts of the text, crucial for text understanding and interpretation. They integrate signals of numerous language

and narrative games that bring about intended ludic effects, contributing to the ludic stylistics of literary text.

Thus, the analysis of ludic stylistics in the "The Science of Discworld" series encompasses two procedures: 1) identifying textual fragments that include verbal and/or narrative signals of ludic stylistics employing the "nodal points" method; 2) examining the semantics and functioning of verbal and narrative means that produce ludic effects in the "The Science of Discworld" series through semantico-stylistic, componential, and contextual interpretative analyses.

3. Results and discussion

3.1. Metafictional games

The importance of storytelling, the main idea of the series, is emphasized in same introduction to the first volume: the concept of narrative imperative, the power of story, is the driving force behind the magic in the universe of Discworld (The Science of Discworld, 2013, p. 10). The authors claim that a narrative mindset does not belong exclusively to the world of literature; they attribute this pattern of thinking to the human race in general and scientists in particular, saying that "science itself has been a discovery of 'stories'." (The Science of Discworld, 2013, p. 11). In this, they follow the postmodernist direction set by Pratchett's Discworld series, manifested in its multiple metafictional strategies, parodies, and eclecticism. In "The Science of Discworld II: The Globe", narrative patterns are presented as simplified models of reality that have "a clarity of structure that does not exist in the messiness of the real world." (The Globe, 2013, p. 327). They are treated as such throughout the series and are often exposed by means of metacommentary. When discussing specific scientific issues, the authors pinpoint the attractiveness of certain ideas to storytellers, especially science fiction writers: "The concept of parallel worlds is dripping with enough narrativium to make any SF author out-salivate Pavlov's dogs." (Darwin's Watch, 2013, p. 190).

The imaginary element "narrativium," mentioned in the citation above, is one of the key concepts in the series since it is both a diegetic explanation to why magic works in Discworld and an external prism through which the comparison between the two worlds is presented. There are several other neologisms that stem from the notion of narrative, such as, notably, "Pan narrans." As opposed to Homo sapiens, Pan narrans is a term that, according to the authors, sums up human nature much more accurately, showcasing storytelling as the preeminent human characteristic: "The anthropologists got it wrong when they named our species Homo sapiens ('wise man'). In any case it is an arrogant and bigheaded thing to say, wisdom being one of our least evident features. In reality, we are Pan narrans, the storytelling chimpanzee." (The Globe, 2013, p. 32). This concept is further developed in the third volume of the series, where it is suggested that due to humans' diversity and proclivity to engage in multiple narratives, they should rather be named "Polypan multinarrans." (Darwin's Watch, 2013, p. 323).

The metafictional game, as well as Pratchett's characteristic ironic tone, is signaled from the very beginning of the series. In the introduction to the first volume, the ludic aspect creates a significant counterpoint to the gravitas of the book's premise: a thought experiment might be a time-honoured scientific endeavour, but it is going to be delivered in a humorous vein (See the irony in a footnote, The Science of Discworld, 2013, p. 13). It is further underpinned by the choice of perspective: the authors choose the Discworld magicians to serve as a foil to the Roundworld science. They are the wizards of Unseen University in the city of Ankh-Morpork, familiar to the reader from several Discworld novels

(Hogfather, Going Postal, Unseen Academicals, etc.). They take Discworld's metaphysical premises for granted, while a world working on a different principle seems absurd or a "parody" (The Science of Discworld, 2013, p. 153), which ironically turns the relationship between the primary and secondary world from the reader's perspective inside out. There is also a size-related change of perspective, as Roundworld is presented as ostensibly small as opposed to its observers. It is often viewed as a small sphere that is kept on a desk. All in all, the presence of familiar characters and locations does not diminish the general effect of defamiliarization employed in the series. An outside look at our universe, together with the overall shift of perspective, enables the reader to participate in this mind-boggling thought experiment and contemplate abstract and scientific notions that it presents.

The dichotomy of magic and science, being at the core of the series, reflects several major concerns of speculative fiction. First, it addresses the much-disputed watershed between science fiction and fantasy, which use science and magic respectively as their main premise. Second, both notions are employed as tools of understanding the human condition, characterized by the constant interconnection between the two, since people have been resorting to the concept of "magic" as a means of processing and appropriating scientific advancement. Magic in this respect is a metaphor for narrating science and creating a relatable story that can be taught to next generations: "A special kind of magic is one of the many things that have made humans what they are. It's called education. It's how we pass on ideas from one generation to the next." (The Science of Discworld, 2013, p. 43).

Consequently, numerous famous scientific theories and experiments are replicated in terms of Discworld magic. It might be done by means of absurdity, such as with the speed of dark, a magic counterpart for the speed of light, which is said to be "yet unmeasured, but believed to be faster than light owing to its ability to move quickly out of light's way." (The Science of Discworld, 2013, p. 30). Similarly, Schrödinger's cat, a famous thought experiment from the field of quantum mechanics, is humorously manifested through the cat Greebo, a character often seen in the Discworld series. The authors employ and extend the joke already used in the novel "Lords and Ladies", stating that a cat inside the box can be "alive, dead, and bloody furious" (Pratchett, 1995, p. 201) and extrapolate it to a larger scientific context (The Science of Discworld, 2013, p. 108–110). Furthermore, the series does not simply employ separate ideas or concepts with ludic purposes; it advocates and seeks to elucidate the scientific method itself. As it has been mentioned, the authors suggest that narrative thinking and scientific mindset are not mutually exclusive. However, they also warn the reader about the traps into which narratives might lead, such as the notions of privatives and reifying (The Science of Discworld, 2013, p. 183–185).

The series discusses such complex scientific concepts as emergence, phase space, chaos theory and fractals, adaptive radiation, infinity, the Higgs boson, and so on. They are given extended explanations accompanied with analogies, some of which will be analyzed below. Several of the scientific terms turn into running gags, such as the notoriously complex notion of quantum, which is used in the series to signal a particularly complicated explication, characteristic of nerdy Ponder Stibbons and incomprehensible to the other wizards:

'Are we near the point where you mention quantum?' said Ridcully, quickly.

'I'm afraid it is looming, sir, yes.' (Darwin's Watch, 2013, p. 29).

The first book, "The Science of Discworld" addresses complexities of the Solar system and the evolution of life on Earth, engaging in a long-standing debate concerning the possibility of life on other planets and space exploration/colonization. The strategy employed to present the evolution on earth plays with the narrative time: it compresses millions of years into several days of experiment for the

wizards. Ironically, most of them totally forgo the whole stage involving humanity, from its earliest rise to an imaginary departure from the planet—a narrative twist that showcases the comparative brevity of the human existence as opposed to the preceding eras: "If the entire history of the universe were compressed to one day, we would have been present for the final 20 seconds." (The Globe, 2013, p. 18). Another method of compressing long periods of time into more palpable units is measuring in "grandfathers" (a period of 50 years) as in "Christ lived 40 Grandfathers ago" (The Science of Discworld, 2013, p. 335).

Zooming in on the human existence in "The Science of Discworld II: The Globe", the authors focus on the mind. Mind is defined early in the book as "a process carried out within a brain made of perfectly ordinary matter, in accordance with the rules of physics" (The Globe, 2013, p. 21), but immediately the complexities and paradoxes of this process are emphasized. The stated goal of the book is to unravel the mystery of the mind's origin, expressed in a characteristically playful way: "How did a Mindless universe 'make up its own Mind'?" (ibid., 2013, p. 19). Here, the importance of storytelling is once again highlighted since it is seen as the chief characteristic of the human mind as opposed to the animal mind. The above-mentioned term Pan narrans, the storytelling chimpanzee, is not just a witty substitution for Homo sapiens: it is a perspective that enables the authors to argue that the storytelling ability is the cause, not consequence, of developing a language (ibid., 2013, p. 159).

One of the major themes of this volume is the dangerous side of the human mind expressed through the concept of Elves. Here Pratchett continues his long-standing dispute with J. R. R. Tolkien, whose influential take on Elves shifted their fictional portrayal towards Faerie, an otherworld full of beauty and wonder for mortals. Conversely, elves (unlike Tolkien, the authors do not capitalize the term) in Discworld are seen as invaders and parasites that influence the human brain by tapping into its imaginative side and prompting it to create monsters. This portrayal is overtly metaphoric in the series: the human propensity to contaminate fantasy with fear and cruelty is referred to as "mental elvishness." (The Globe, 2013, p. 333). An essential element of mental elvishness is an ability to believe in monsters as envisaged by humans, essentially reifying them, i.e., making them real.

The wizards of Unseen University embark on a quest to protect Roundworld from the elves. The authors employ the time-travelling device to send the wizards to various stages of human history and ultimately concentrating their efforts on William Shakespeare. The wizards gradually arrive at a counterintuitive discovery that complete "de-elving" is destructive to the development of human civilization. They settle, therefore, for a more subtle solution, which involves the power of art and storytelling in particular. Storytelling is seen as a tool of critical thinking which undermines the power of belief, resulting in a paradoxical effect of "seeing is not believing." (The Globe, 2013, p. 342). This, in practical terms, means that seeing elves in Shakespeare's "A Midsummer's Night Dream" performed in the Globe with fairy-like elves diminishes the belief in them and leads to their ultimate loss of influence on the human brain.

This volume makes several important connections. First, in tracing the evolution of the human brain, the authors underpin the significance of cheating and lies, treating them as a survival mechanism and an essential component of empathy. Second, the phase space is given a detailed account and shown to be an indispensable condition for the human brain to evolve. Furthermore, the concept of emergence as a feature of complex systems is connected with storytelling, with far-reaching ramifications for human history and our ability to "predict" it. The authors see a constant dynamic unfolding in human history, where complexity is dealt with by means of stories: "Stories map out the phase space of existence." (The Globe, 2013, p. 327). The focus on storytelling within the time-travel frame enhances the metafictional

stance of the series: as David Leiby points out, plots centred on time-travel produce self-reflexive fiction and encourage the reader to analyze the structure of time and consequently, the construction of the narrative (Leiby, 2002, p. 38). This observation is certainly true for the "The Science of Discworld" series.

The third volume, "The Science of Discworld III: Darwin's Watch", continues the time-travel theme: the wizards discover that Charles Darwin's "The Origin of Species" plays a pivotal role in human history and they make sure that he is given the opportunity to write it. The antagonists who are trying to prevent this from happening are the Auditors of Reality, known from several Discworld novels ("Reaper Man", "Hogfather", and "Thief of Time"). They are non-human entities that believe in universal rules and despise imagination.

Since "Darwin's Watch" juxtaposes religious and scientific worldviews, two distinct timelines are envisioned for Darwin: in the alternative version of reality, he writes the "wrong book" entitled "Theology of Species", which leads to intellectual stagnation in Victorian England. Although "The Origin of Species" gets written in the same reality later on by someone called "the Rev. Richard Dawkins", it is too late for humanity since it will not have reached the necessary level of development in time to escape the earth via a space elevator. After a series of hilarious adventures, often verging on absurdity, the wizards finally create the circumstances that enable Darwin to write the "right book." The key message of this volume, nevertheless, is not the serendipity of the 'right idea in the right time.' On the contrary, the authors state that one single thinker cannot enact significant changes on their own, and their "fictional Darwin is "a symbol for an endless stream of Darwins, challenging orthodoxy and being right, a glorious network of innovative thinkers and radicals." (Darwin's Watch, 2013, p. 324). The human mind and the consequent social evolution thrive on a multitude of stories that develop multi-causal understanding and substitute an urge for simple explanations. It is the essence of the term Polypan multinarrans, a hoped-for state rather than a realistic one. It is, to an extent, a cautionary tale that warns of the dangers of "master narratives" and the intellectual stagnation they may lead to.

The fourth and the final volume in the series is called "The Science of Discworld IV: Judgement Day". Following Gregory Benford, the authors address two fundamental worldviews: human-centred and universe-centred. To dramatize this dichotomy, they introduce a conflict between the wizards of Unseen University and Discworld priesthood, represented by the fundamentalist Omians who have always claimed that the Disc was round. The confrontation results in an actual trial (accounting for the eponymous "judgement day"). The plot is further complicated by the arrival of Miss Daw, a Roundworld librarian and a rational thinker, who has to wrap her head around the complex interaction between the two worlds, particularly with regard to the origins of Roundworld.

The book examines logical fallacies in which human theories about the origins of the universe abound. Once again, the influence of storytelling is considered, in this case with an emphasis on linearity as opposed to non-linearity. While causality is compared to a web, a non-linear structure, the human mind is shown to grapple for linearity in its accounts of the origins: "and that is why storytelling-human narrativium-finds origins to be so difficult and puzzling, and sometimes looks for simplicities where none exist." (Judgement Day, 2014, p. 147). In the chapter entitled "Farewell, Fine-Tuning" the authors debunk the idea of intelligent design by questioning the appropriateness of analogies, such as "balancing on a cosmic knife edge." (ibid., 2014, p. 283). This once again highlights the ambiguity of storytelling, which, by means of a memorable image or a well-spun tale, might reinforce a preconceived idea rather than question it. The authors strive to demonstrate that storytelling in science is used differently (although scientists may fall victim to the same lure) since its aim is to disprove a false hypothesis, even if one would like it to be true. The adage about science in this volume runs as the following: "That's not a belief system.

It's a disbelief system." (ibid., 2014, p. 270). Ironically, the antithesis employed in this statement is in itself memorable and aphoristic, which demonstrates that the authors themselves are not immune to the above-mentioned lure.

3.2. Intertextual games

Due to the exceptional place that storytelling occupies in the series, it is worth elucidating on the narrative and stylistic techniques that the authors employ to convey their ideas. It is not surprising that "The Science of Discworld" books build their arguments in a constant conversation and often debate with other texts. The intertextual game reveals itself through references to other books within the Discworld series, allusions to numerous texts, both fiction and non-fiction, outside Discworld, sometimes quoting them directly. There are multiple references to Greek mythology and philosophy, religious texts, especially the Bible, and numerous authors, such as W. B. Yeats, Charles Dickens, James Joyce, Herbert Wells, J. R. R. Tolkien, Arthur C. Clarke and others. Among the quoted scientists one finds David Hume, Albert Einstein, Richard Feynman, Stephen Hawking, Richard Dawkins, and many others. Due to the series' propensity to question certain scientific issues and engage in longstanding debates, there is a great deal of self-consciousness with regard to the referenced field. For example, when the time-travel trope is discussed in the third volume, the "grandfather paradox" is referred to as "the ultimate cliché" and then ridiculed for its repetitiveness: "Quite why it's always your grandfather isn't clear (except as a sign that it's a cliché, a low-bred form of narrativium)." (Darwin's Watch, 2013, p. 63). Rather than presenting a consistent, all-encompassing scientific picture, the authors deliberately highlight numerous contradictions and inconsistencies that appear in the scientific discourse, resorting to subtle allusions like "Watch-22" in a chapter title in the third volume or calling "free will" an oxymoron (ibid., 2013, p. 219).

While some of the allusions may resemble an occasional Easter egg, such as a playful reference to the famous "Do not meddle in the affairs of wizards" quote from "The Lord of the Rings" ("sometimes even wizards know when not to meddle" (Judgement Day, 2014, p. 306), others help develop the key ideas of the series on a conceptual level. Thus, the "turtles all the way down" phrase, taken from Stephen Hawking's "A Brief History of Time", is used to discuss cognitive biases inherent in our way of thinking about the universe. As the discussion unfolds, the phrase metamorphoses into "creators all the way back" (ibid., 2014, p. 64), projecting a flaw in cognition onto a more general issue. Similarly, the discussion of the power and dangers of belief later in the same volume opens with a Biblical reference, which is immediately challenged: "Although it is widely held that faith can move mountains, it has not reliably been seen doing so." (ibid., 2014, p. 307). The challenge might be ironical, but it foreshadows a serious polemic concerning morality with regard to religious beliefs.

Among the most significant sources of allusions in the series are the works of William Shakespeare, as well as his own persona. Since the second volume juxtaposes "real" and theatrical elves, it culminates in the staging of "A Midsummer's Night Dream", and the corresponding episodes rely on the reader's close acquaintance both with Shakespeare's plays and the Globe's history. The image of the bard himself is used as a cultural symbol, or rather a synecdoche, since Shakespeare is a part that represents the whole (a concrete storyteller creating a powerful narrative in this particular case).

While "A Midsummer's Night Dream" is pivotal for the story, other Shakespearean plays, quotes and characters are transformed to create comical effects, as in "Now is the December of our discontent." (The Globe, 2013, p. 252). Comic modification of an allusion and its conceptual application can overlap in the series. An example of this can be found in the fourth volume, in the chapter on fine-tuning, where a fairy-tale character Goldilocks is employed to represent the habitable area located at such a distance

from the Sun that the temperatures are "just right," in other words, "Goldilocks zone." (Judgement Day, 2014, p. 296). After demonstrating that life adapts to the environment rather than the environment is specifically designed for the life to appear, the authors offer a humorous Goldilocks comeback: "Goldilocks doesn't have the final word: Daddy Bear and Mummy Bear have valid opinions too." (ibid., 2014, p. 298). This example also demonstrates that Ian Stewart and Jack Cohen share the revisionist attitude to fairy-tales that Pratchett demonstrated on numerous occasions in Discworld novels. Such takes on allusions contribute considerably to the postmodernist ludic aspect of the series.

3.3. Language games

Another prominent feature of the ludic stylistics of this series is the extensive use of metaphors, particularly conceptual ones, often employed to underpin and elucidate diverse ideas. For example, the universal conceptual metaphor, LIFE IS A GAME, is seen throughout the series in various manifestations, including chess, cards, and other games. Thus, a universe in a multiverse is called "a single card dealt from Fate's deck." (The Globe, 2013, p. 149). In the third volume, where time-travel and the repercussions of changing the past are explored, history is conceptualized as a game of chess. Adding or removing events in history is equated to altering the position of the pieces on the board: "We change the positions of a few of the pieces on the great chessboard of life, the universe and everything, but we still keep to the rules of chess." (Darwin's Watch, 2013, p. 214). Another conceptual metaphor TIME IS SPACE becomes essential both for conveying scientific ideas and for narrating the wizards' part of the story, as they jump through time and enter Roundworld's history at various points. The human mind is often conceptualized as a computer, which enables the authors to speak of "programming" our mind in a certain way (The Globe, 2013, p. 155). Metaphors also serve to elaborate differences between contrasting notions. For instance, "a complicated system" and "a complex system" are juxtaposed with the help of the metaphors of SYSTEM IS A MECHANISM and SYSTEM IS A GARDEN (ibid., 2013, p. 152–153).

Many of the conceptual metaphors that are used to showcase an idea or an argument are extended and reinforced with other stylistic means. In the second volume, within the discussion of storytelling and critical thinking, the authors extend the metaphor THINKING IS NAVIGATING, relying on antonomasia and intertextuality: they engage allusions to Discworld characters and Greek mythology: "You can be a Granny Weatherwax, sailing through story-space like a master navigator, attuned to every breath of narrative wind (and a lot of it is, mark you), tacking against the gale like a maverick, avoiding the Shoals of Dogma and the Scylla and Charybdis of Indecision…" (The Globe, 2013, p. 330). In the third volume, another extended metaphor develops the concept of KNOWLEDGE IS WATER, equating the process of knowledge modification and discarding of certain ideas with evaporation: "The development of science is mostly an incremental process, a lake of understanding filled by the constant accumulation of innumerable tiny raindrops. Like the water in a lake, the pool of understanding can also evaporate again—for what we think we understand today can be exposed as nonsense tomorrow, just as what we thought we understood yesterday is exposed as nonsense today." (ibid., 2013, p. 18) A further extension of the same concept highlights the exceptional role of famous scientists in the accumulation of knowledge. Newton's contribution is said to be "not a shower of rain disturbing the surface of the lake, but an intellectual storm that unleashed a raging torrent", while "Darwin's torrent still rages today." (ibid., 2013, p. 19).

In a similar fashion, ludic strategies encompass idioms which are often transformed and extended, while their inherent metaphorical meaning may be revitalized. Apart from explicating scientific ideas,

this helps create a particular emphasis, such as, for example, the one placed on comparative values of time and space in the first volume (an idea often reiterated there): "in twelve million years—the twinkling of a geological eye." (The Science of Discworld, 2013, p. 165). In the third volume, while examining the flaws in the logic of those who favour creationism, the authors extensively exploit metaphors relating to design and mechanisms, which allows them to emphasize certain points with idioms from the corresponding source domain: "But Darwin's 'dangerous idea' […] puts a very big spoke into the wheel of cosmic design." (Darwin's Watch, 2013, p. 13).

Inevitably, in such extensions, mixing of metaphors occurs. Some of the cases are highly characteristic of Terry Pratchett's signature style, resulting in a humorous effect: "The deeply magical and interminably ancient volumes in the Library of UU strained the fabric of L-space like a baby elephant on a worn-out trampoline, leaving it so thin that the library was a potent and easy portal." (The Globe, 2013, p. 40). But once again, a touch of absurdity and rampant imagery more often than not give way to complex ideas, clarified (or further complicated) by mixed metaphors. In the third volume, in the discussion of what the authors call Make-A-Human-Being kits (everyday experiences, images, ideas that produce a formative impact on the personality), they argue that a lot of people's emotional perceptions stem from the religious domain, even if they are not religious. The metaphor that is employed to convey this idea is that of "emotional tags" attached to everything. In the following excerpt this metaphor appears in the same sentence with the gustatory metaphor of "flavour:" "most people, until quite recently, underpinned that unexamined set of beliefs with a theist (personal, humanlike) god or gods, or a deist (something up there with extraordinary powers) god-structure, so the emotional tags on important memories have been strongly Godflavoured." (Darwin's Watch, 2013, p. 293). Commenting on creative and experimental use of mixed metaphors in literature, Karen Sullivan notes that many authors, including Shakespeare, have used "sequences, combinations, and permutations of metaphors […] to create memorable literature and witty aphorisms." (Sullivan, 2019, p. 188). This is certainly true about the series in question.

The process of combining, extending and transforming metaphors in the series is sometimes paired with personification. The above-mentioned emphasis on the comparative brevity of human existence on earth is reinforced by the contrast between the human timescale and that of the solar system: "On its own timescale, hundreds of millions of years, it's full of drama and excitement, with planets roaring all over the place, whirling around each other, and dragging each other out of orbit in a mad gravitational dance." (The Science of Discworld, 2013, p. 125). This personification of astronomical bodies is further developed with the story of a giant comet that "had a love affair with mars (giving rise to a brood of baby comets), and finally retired to live in peace as Venus." (ibid.). Such personification may acquire aphoristic quality, as in the witticism that "the earth had a bit of personal magnetism." (ibid., 2013, p. 144). Humorous personifications similar to this one abound in the series. In the third volume, in a metonymical generalizing transition from physicists to physics, the latter is often personified in a flippant manner: "So physics, not for the first time, has adopted inconsistent viewpoints for different aspects of the same question, and has got its philosophical knickers in a twist as a result." (Darwin's Watch, 2013, p. 109). In addition to this, different conceptual frameworks are employed to enhance the accessibility of the scientific section, such as debit/credit in relation to oxygen/carbon dioxide (The Science of Discworld, 2013, p. 161–162), professional/amateur in relation to animals at various stages of evolution (The Globe, 2013, p. 134), or weapon/arms race in the discussion of the importance of lies in the development of the mind (ibid., 2013, p. 283).

As is traditional for popular science books, the series resorts to numerous analogies that facilitate the understanding of abstract and complex notions. At times, the authors use simplistic, easy-to-grasp images, such as "tennis players:" "The four bosons 'mediate' the forces, much as two tennis players are held together by their mutual attention to the ball." (Judgement Day, 2014, p. 19). In other cases, however, analogies are themselves complicated and extended, as in the second volume where the impossibility of establishing exactly when non-science became science is approached via multiple analogies, ranging from a chair to a human embryo (The Globe, 2013, p. 235–236). In the third volume, where the line of reasoning is based on refuting teleological argumentation, represented by Paley's famous watchmaker analogy, the image of the watch is used to incorporate several key ideas of the series. To convey the complexity of the evolution the watch analogy is revisited and given an ironic slant with the help of absurdist associations: "When you see a watch, do not think of hooking up springs and adding cogwheels from some standard box of spare parts. Think more of a Salvador Dali 'soft watch' that can flow and distort, deform, split apart, and rejoin. Think of a watch whose cogwheels can change shape, grow new teeth, and whose axles and supports evolve along with the cogs so that at every stage the whole thing fits together. Think of a watch that may have started out as a paper clip, and along the way became a pogo-stick." (Darwin's Watch, 2013, p. 47). As with mixed metaphors discussed earlier, this stream of analogies contains striking imagery that is both memorable and thought-provoking.

At times, analogies are employed to debunk other analogies, such as the "cosmic knife edge" in the fourth volume, which represents the key argument used by the proponents of the intelligent design theories. The idea that is refuted is that the laws of nature are so finely tuned that changing even a small element would inevitably lead to the collapse of the whole system. The authors outline two main flaws in this line of thinking and underpin them both with their own analogies: that of a car mechanism and of exploring only a small proportion of a city and assuming that you have seen the whole thing (Judgement Day, 2014, p. 291). The former illustrates the irrelevancy of speaking of one element within a system only, since the whole may still work if you change several elements to make up for the alteration of one; while the latter elucidates the mathematical inaccuracy of popular assumptions about the universe.

In discussing theories concerning probability expressed in Julian Barbour's "The End of Time", the authors employ the analogy of the snakes and ladders game, developing "the quantum version of the game." (Darwin's Watch, 2013, p. 82) which prepares the reader for their alternative vision of the same issue. Several notions, including that of momentum, are considered in terms of quantum snakes and ladders, which is resonant with the series' overall reliance on thought experiments. In a way, metaphors, personifications, and analogies are viewed in the series as thought experiments in themselves. Among other things, they are constantly questioned and problematized since they clearly belong to the storytelling arsenal, while storytelling is itself under constant scrutiny.

The novelty and complexity of certain ideas put forward by the authors in the course of this thought experiment naturally result in coining of new words. Some of the neologisms are taken from other popular science books by the same authors, as, for example, the key term "extelligence," a counterpart of intelligence. The term was introduced in the book "Figments of Reality: The Evolution of the Curious Mind" by Jack Cohen and Ian Stewart (1999), where they defined it as "the accumulating knowledge of generations of intelligent beings" that is constantly modified and organized itself through interactions between these being (Cohen, 1999). This concept is introduced in "The Science of Discworld" in the chapter aptly entitled "Extel Outside" (a pun on the famous "Intel Inside" slogan), where it is closely connected with another idea that induced the authors to stretch dictionary definitions. The way they employ the word "complicity" suggests interconnectivity between intelligence and extelligence, their

coevolution, and interaction that leads to the emergence of unpredictable results (The Science of Discworld, 2013, pp. 347–349). Similarly to the imaginary element "narrativium," which accounts for the magic of Discworld, a name for another element is coined: "deitygen," which is necessary for the existences of deities (The Globe, 2013, pp. 296–297). Nonce words are also frequent in the series, for example, a combination of "evolution" and "Olympics" gives "Evolympics" at the end of the passage where Olympic games were used as an analogy to explain simultaneity of various processes in the evolution of species (Darwin's Watch, 2013, p. 43). A nonce word might also stem from an allusion, as in the following example from the fourth volume: "Instead of being a gigantic hypersphere, or a flat Euclidean space, the universe might be more like an etching by the Dutch artist Maurits Escher. Welcome to the Escherverse." (Judgement Day, 2014 p. 227). The term "Escherverse" only makes sense to the reader who is familiar with the visual art of Maurits Escher, and it is used later in the book several times without any additional explanations.

Apart from conceptual coinages, the authors freely resort to flamboyant wordplay, including individual words, such "li-ee", signifying a person being lied to (The Globe, 2013, p. 150) and phrases, e.g., "everywhere and everywhen" (ibid., 2013, p. 38) or "there are ways to make the inevitable evitable." (Darwin's Watch, 2013, p. 228). Puns are ubiquitous in the series. Three of the four volumes contain puns in their titles, the most polysemantic of which is the name of the third one, **"**Darwin's Watch", being a reference to an object (Paley's watch analogy), a process of guarding someone (wizards making sure Charles Darwin gets to write "the right" book), as well as the process of observing a natural phenomenon. Numerous chapter titles are based on puns or on metaphorical expression that renew their literal meanings, such as "Borrowed Time" in the third volume, wherein the idiom "to live on borrowed time" acquires a more direct meaning in the context of time travel, which is the subject matter of this chapter. Punning in the series is rather self-conscious, as the authors draw the reader's attention to the fact that they are using wordplay, sometimes with self-deprecating undertones and allocation to the footnotes.

As it has been seen in many examples above, irony is prevalent in the series on several levels. There is a pronounced ironic stance in the adopted perspective and juxtaposing Discworld and Roundworld. A lot of tongue-in-cheek comments about Roundworld invite the reader to contemplate the baffling absurdity of our world. A comment about the state religion in the UK, for example, is accompanied by a statement that "Unlike Discworld, Roundworld doesn't have to make sense." (Darwin's Watch, 2013, p. 22). Here it is helpful to apply Linda Hutcheon's study of the functions of irony, which will allow us to suggest that the series performs an aggregative, inclusionary function, aiming at establishing an "amiable community," the members of which might enjoy "the pleasures of collaboration, even collusion." (Hutcheon, 2005, pp. 51–52). The community in question can be characterized as a group of readers interested in science, often admirers of fantasy and science fiction, engaged in a continuous intellectual quest despite the awareness of human limitations. Self-deprecating irony of the authors reinforces the idea of complexity that permeates the series and emphasizes contradictions and inconsistences inherent in human attempts to interpret the universe. Ironic comments that perform this function often resort to "we." "Or so we fondly imagine." (Darwin's Watch, 2013, p. 64). This "we" clearly includes the readers and envisages a community that shares the same attitude: "Let's move from large events, large or small causes, to how we influence the apparent causality in our own lives. We have invented a very strange oxymoron to describe this: 'free will'." (ibid., 2013, p. 219).

As far as some of the key issues of the series are concerned, an aggregative function of irony may give way to its oppositional and transgressive mode, turning into sarcasm and satire. The targets of the

authors' satirical attacks include politics, religion, and mass media. These attacks remain largely generalized, without personal references, as the following barb aimed simultaneously at monarchy and historiography in the second volume, stating that period in history "are named after kings, as if the country was defined by whichever stony-faced cut-throat had schemed and knifed his way to the top." (The Globe, 2013, p. 294). In the third volume, the authors provide an excerpt from a radio chat show, which expresses the doubt in Darwin's work on the grounds that he never got the Nobel Prize. Satirical as it is, the episode conveys another general idea rather than criticizes a specific show or radio station. Thus, the chat show fragment acts as a synecdoche for uninformed and biased opinions spread by unscrupulous mass media (Darwin's Watch, 2013, p. 11). Not surprisingly, science itself occasionally becomes the object of satire, or rather a number of science-related phenomena, such as peoples' attitudes and social practices. The way scientific projects are (mis)understood by society and how they get support and financing is ridiculed through the image of the Great Big Thing in the fourth volume. This satirical antonomasia turns into an actual plot device, since the wizards start the Great Big Thing project at Unseen University, which sets off a series of events. In the non-fiction part this is explained in pragmatic terms: "However, it is in the nature of Great Big Things that if the money isn't spent on them, it isn't spent on smaller scientific projects either. Small projects don't advance bureaucratic or political careers as effectively as big ones." (Judgement Day, 2014, pp. 20–21) As it happens frequently in these four volumes, as well as in the Discworld series in general, an idea is played with on several levels: as an abstract notion (with a satirical flair in this particular case) and as a concrete object/phenomenon, taken literally and often endowed with magic qualities. The dichotomy of the fiction and non-fiction sections in the Science of Discworld series enhances both the contrast and the connection between the two.

This constant shift between the fiction and non-fiction sections in each volume together with a variety of metafictional techniques account for the ludic character of the narrative (Izotova, 2021; Tykhomyrova, 2011, 2014). One of the prominent playful features in the series is addressing the reader. For examples, while the "lies-to-children" strategy is explained in detail as an abstract phenomenon essential to human history and, particularly, education, it is later implied that "lies-to-children" approach is applied to the reader (The Science of Discworld, 2013, p. 173). Footnotes are also involved in the metafictional game, which has long been a distinctive feature of Discworld novels. For example, some scientific ideas are framed as mind games with the reader, who is presumably caught in the trap of "privative" thinking, only to learn from the footnote that is normal "you are a human being thinking narratively." (ibid., 2013, p. 182). The idea of "lies-to-children" and its ramifications are further discussed in the second volume where a potential emotional reaction of a reader is projected: "We can hear the hackles rising even as we write, as quantum signals echo back down the timelines from future readers in the teaching profession turning to this page. But before hurling the book across the room or sending an offended e-mail to the publisher, ask yourself just how much of what you tell children is true." (The Globe, 2013, p. 291). The authors also resort to running gags, such as "everything contains nuts" in a footnote (ibid., 2013, p. 245) and enhance their metafictional stance by self-consciously drawing the attention of the reader to the writing/publishing process (Darwin's Watch, 2013, p. 23). They might apologize for abusing certain kinds of jokes, as they do (once again in a footnote) in the second volume: "Sorry about the proliferation of barnyard metaphors." (The Globe, 2013, p. 279). They even encourage the reader to devise their own explanations if the ones provided by the authors do not work for them: "Oh, invent your own explanation." (Darwin's Watch, 2013, p. 237, a footnote). This ironic self-consciousness extends as far as the nature of humour itself, of which the authors are also aware, both on the level of non-fiction scientific sections of the series and the plot-driven fictional ones: "Rincewind limped in, his face like thunder, water still streaming off him, with something grasped in his hands. Halfway across the hall a

fish fell out of his robe, in obedience to the unbreakable laws of humour." (ibid., 2013, p. 207). All in all, the humour in the series, although varied, tends to gravitate towards self-awareness and reflexivity with a touch of self-deprecation that ultimately reinforces the aggregative agenda mentioned above.

4. Conclusion

To sum up, "The Science of Discworld" is a unique literary endeavour that showcases the authors' experimentation with narrative conventions based on interdiscursivity. Defined as a specific narrative strategy, interdiscursivity in the "The Science of Discworld" series becomes evident through the intricate interplay of fictional and non-fictional discourses. This gives rise to ludic stylistics in "The Science of Discworld", which manifests itself at both the micro and macro levels due to the unconventional use of linguistic elements of all rank. Ludic microstylistics of "The Science of Discworld" illustrates the effectiveness of language games in the process of fictional narrative deconstruction. These games are primarily created by the innovative combinations of various figures of speech, including metaphors, personifications, antonomasia, analogies, neologisms, puns, irony, and more. Ludic macrostylistics is represented through narrative games, predominantly featuring metafictional and intertextual techniques. On the whole, ludic stylistics emphasizes the ontological aspects of the "The Science of Discworld" series while illuminating divergent narrative text-building and meaning-making thus highlighting the idiosyncrasies of contemporary artistic thinking.

Author contributions

Conceptualization, OT and NI; methodology, OT and NI; validation, OT and NI; formal analysis, OT and NI; investigation, OT and NI; resources, OT and NI; data curation, OT and NI; writing—original draft preparation, OT and NI; writing—review and editing, OT and NI. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

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