MIĆO TATALOVIĆ[1]

REPRESENTATIONS OF SCIENCE AND INNOVATION IN *PROFESSOR BALTHAZAR* AND RELATED FILMS OF THE ZAGREB SCHOOL OF ANIMATION

ABSTRACT

This article examines how the Croatian animated series and its eponymous protagonist, Professor Balthazar, portray science and the hopes and pitfalls of technological innovation. It suggests that the whimsical world of the popular inventor emerged from the rich opus of the Zagreb school of animation's previous work, and examines intertextual elements related to science and technology. Created during the 'golden age' of the Oscar-winning Zagreb Film studios, the colorful series communicates an image of a scientist that is less stereotypical than characters from the school's preceding films, and it includes depictions of the fallible, human side of scientific discovery and its applications. It also presents an ambiguous image of innovation, mixing techno-optimism with a critique of unintended consequences of new technology. As such it both parallels and contrasts with other cartoons from the same studio. This article opens up a new avenue for research, as the science and innovation aspects of the school's work have so far largely been overlooked by scholarly literature.

KEY WORDS: cartoon, animation, Zagreb Film, Yugoslavia, Croatia, Zagreb school of animation, popular science, *Professor Balthazar*.

[1] Mićo Tatalović is a science journalist and academic from Rijeka, Croatia, who lives and works in London, UK. He studied biological sciences at the University of Oxford and the University of Cambridge, and science communication at Imperial College London, where he researched the role of comic books in communicating science. He has also completed the Knight Science Journalism fellowship at MIT, in Cambridge, Massachusetts, US, researching the use of artificial intelligence in science writing. His work experience includes news editing for *SciDev.Net*, *New Scientist*, *Nature* and *Research Professional News*.

INTRODUCTION

Professor Balthazar is an internationally acclaimed series of the Zagreb school of animation, celebrated for its award-winning work during the 1960s and 1970s.[2] It has been dubbed by scholars as a "cult series"[3] that is "among the best TV series ever made."[4] The cartoon was popular both at home, and abroad,[5] and it remains Croatia's "most famous" animated series.[6] *Professor Balthazar* features an eponymous gentle scientist described as a "famous inventor," who is widely recognisable in Croatia, where he features in the school curriculum and is known by practically all children.[7]

The four-season series, produced between 1967-1978, has been "remarkably popular" outside the country, too, for example in Denmark, Finland, Italy, Iran, the Netherlands, Norway, and Sweden.[8] A recent analysis by the Professor Balthazar Association, which is dedicated to preserving the character, suggests it still has a global appeal,[9] and there is now a new season of the series being produced,[10] as well as a computer game being developed by Gamechuck studios in Zagreb.[11] Its innovative visuals have inspired other animations, such as the Beatles film *Yellow Submarine* (George Dunning, 1968)[12] in which the submarine looks very much like one of Balthazar's many whimsical contraptions, as well as Disney's *Wander Over Yonder* (Craig McCracken, 2013-2016).[13]

2 Midhat Ajan Ajanović, "Mali čovjek na razmeđu svjetova" / "Little Man at the Turn of the Worlds," *Hrvatski Filmski Ljetopis* 6, no. 23 (2000): 142-59. See also: Paul W. Morton, "Boomerangs and Bombs: The Zagreb School of Animation and Yugoslavia's Third Way Experiment," *Slavic Review* 79, no. 1 (2020): 115–38.

3 Midhat Ajan Ajanović, *Animation in Croatia: Zagreb School and Beyond* (Boca Raton: CRC Press, 2025), 144.

4 Gianalberto Bendazzi, *Animation: A World History, Volume 2* (New York: CRC Press, 2017), 262.

5 Ranko Munitić, *Zagrebački krug crtanog filma 1–Pedeset godina crtanog filma u Hrvatskoj. Almanah 1922-1972*, ed. Zlatko Sudović (Zagreb: Zavod za kulturu Hrvatske – Zagreb Film, 1978a), 256.

6 Mihaela Majcen Marinić, *Prema novoj animaciji: Povijest novijeg animiranog filma u Hrvatskoj* (Zagreb: MeandarMedia, 2014), 119.

7 Tena Pejakušić, "Filmovi o profesoru Baltazaru u nastavi medijske kulture za djecu mlađe školske dobi" / "Professor Balthazar films in the teaching of media culture in lower primary school," (Master's thesis, Josip Juraj Strossmayer University of Osijek, Croatia, 2018). See also Bendazzi, 263.

8 Sanja Bahun, "Croatian Animation, Then and Now: Creating Sparks or Just a Little Bit of Smoke?," *Kinokultura* 11, 2011.

9 "Association Professor Baltazar," https://profesor-baltazar.hr/en/.

10 Josip Grozdanić, "O novim epizodama Profesora Baltazara" / "On new episodes of *Professor Balthazar*," *HRT* (Zagreb, Croatia), April 3, 2025.

11 Lovro Belošević, "Legendarni profesor Baltazar uskoro dobiva novu dimenziju: postaje video igra" / "The legendary *Professor Balthazar* is about to gain a new dimension: it is becoming a video game," *Jutarnji List* (Zagreb, Croatia), September 7, 2023.

12 Luigi Scarpa, "Professor Balthazar: Animated Series for Children by Zagreb Film," *Hrvatski Filmski Ljetopis* 17, no. 65 (2011): 9.

13 Ramin Zahed, "McCracken's 'Wander Over Yonder' Premieres Tonight," *Animation Magazine,* September 13, 2013.

The series was "a joint artistic effort of the most talented animators and creators" who were at the "height of their creative" power, and it was the "only real commercial product of the Zagreb School."[14] Zagreb Film's early animation work was baptized enthusiastically as a 'school' by the film critics Georges Sadoul and André Martin,[15] at the 1958 Cannes Film Festival where the films "caused a real sensation."[16] The school excelled in cel animation technique, and it introduced new ideas to the field through research and experimentation with animation.[17] Its work was characterized by "reduced animation" and "stylization" and thereby introduced the second principle into the field, the first one being Walt Disney's full animation.[18] It was considered to be "avant garde" and "intellectual,"[19] and with its reduced animation was said to have introduced a "canon that became generally accepted and recognized in the world of animation festivals, elite magazines and elite criticism."[20]

Some of their science-related animations anticipated later productions in Hollywood and elsewhere. For example, the Stone Age world depicted in *Susret u snu / Encounter in a Dream* (Nikola Kostelac, 1957) is similar to the one we see a few years later in *The Flintstones* (Joseph Barbera and William Hanna, 1960-1966), including the idea of a car powered by the passengers' feet.[21] Similarly, the space age world and robots in *Djevojka za sve / All-Around Help* (Nikola Kostelac, 1959) are similar to what we see a few years later in the American cartoon *The Jetsons* (Joseph Barbera and William Hanna, 1962-1963). And *Nestašni robot / Playful Robot* (Dušan Vukotić, 1956) was "anticipating the later great success" of Osamu Tezuka's Japanese anime series *Astro Boy* (1963), whose opening episode is "reminiscent of Vukotić's work in terms of its morphological and animation characteristics."[22]

Professor Balthazar is a product of the golden age of this world-renowned school,[23] which won numerous awards, including an Oscar for *Surogat / The Substitute* in 1962.[24] The school was honoured with an exhibition at New York's Museum of Modern Art in 1968,[25] and its members have been celebrated for their skill and output, with many academic works examining their work;[26] but apart from Tatalović

14 Joško Marušić, *Alkemija animiranog filma: Povijest, estetika, tehnologija / Alchemy of the Animated Film: History, Aesthetics, Technology* (Zagreb: Meandar, 2004), 115-16.

15 Hrvoje Turković, *Život izmišljotina: Ogledi o animiranom filmu / A Life of Fiction: Essays on Animated Film* (Zagreb: Hrvatski Filmski Savez, 2012), 201.

16 Marušić, *Alkemija*, 117.

17 Munitić, *Zagrebački krug crtanog filma 1*, 439. See also: Ranko Munitić, *Zagrebački krug crtanog filma 2–Odabrani scenariji i knjige snimanja crtanih filmova zagrebačke škole*, ed. Zlatko Sudović (Zagreb: Zavod za kulturu Hrvatske – Zagreb Film, 1978b), 14.

18 Marušić, 126-27.

19 Munitić, *Zagrebački krug crtanog filma 1*, 156.

20 Turković, *Život izmišljotina*, 205.

21 This anticipation was noted by several scholars, including Ronald Holloway, *Z is for Zagreb: A Guide to the Films of One of the World's Major Cartoon Studios* (London: The Tantivy Press, 1972b), 54; Nenad Pata, *Dušan Vukotić – VUID* (Zagreb: Korpus and Zagreb Film, 2007), 18; and Ajanović, *Animation in Croatia*, 76.

22 Ajanović, *Animation in Croatia*, 77.

23 For example, see Ajanović, "Little Man," 2000, and Bahun, 2011.

24 Paul W. Morton, "Boomerangs and Bombs," 2020.

25 Ibid.

26 Ibid. Also see Ajanović, "Little Man," 2000, and Scarpa, 2011.

(2025a[27], b[28]), none have focused on the science and innovation aspect. This article aims to start filling that omission.

I first analyse how the *Professor Balthazar* series presented science and scientists, by close reading of all episodes from the first four seasons, which are available on the Zagreb Film's official Youtube channel.[29] I situate those readings in the wider context of literature on images of science in popular media, TV and film. I then turn to Zagreb Film's wider opus to note and analyze similarities and differences in representations of science and technology in their animations that preceded *Professor Balthazar*.[30] I focus specifically on titles from the early work of Zagreb Film in 1956 and its initial rise to fame, through its golden age of the 1960-70s, as those were the films that preceded or were contemporary to *Professor Balthazar*.[31] The analysed films are mostly available on the Zagreb Film's two official Youtube channels, and listed in the most comprehensive compendium about the school's work, the four encyclopedic volumes edited by Zlatko Sudović, as well as other relevant literature. Finally, I examine the images of technology in *Professor Balthazar* as a reflection of the thematic preoccupations in the school's earlier works, and situate them in the socio-political context of the time.

REPRESENTATION OF SCIENCE AND SCIENTISTS IN *PROFESSOR BALTHAZAR*

The professor may appear clichéd at first: he is a middle-aged white man, bearded and bald, wearing glasses and working alone in his laboratory—all of which are characteristics of the scientist stereotype as identified by Mead and Metraux (1957),[32] and expanded on by others.[33] As a fashionable and sociable gentleman wearing a suit, top hat and carrying out research in a laboratory in his big townhouse, he also evokes some aspects of the nineteenth century's "great men of science."[34] Such stereotypes

27 Mićo Tatalović, "Educational Value of Representations of Science and Innovation in the *Professor Balthazar* Animated TV Series," *Cultures of Science*, 2025.

28 Mićo Tatalović. "Science, Utopia, and Socialism in Yugoslav Animation: The Case Study of Professor Balthazar," *Alternator*, 2025.

29 "Zagreb Film Official Channel," *Youtube*, https://www.youtube.com/channel/UC89rPgNteI7yaxCfpPIQ_AA, Accessed August 21, 2025.

30 For a general discussion of the school's films and how they developed, see Ajanović, "Little Man," 2000. For a discussion of repeating motifs and characters in *Professor Balthazar*, see Scarpa, 2011.

31 Various authors have discussed different periods of the Zagreb school, but generally recognize the so-called 'golden age' of the late 1950s and 1960-70s. See Marinić, 16; Ajanović, *Animation in Croatia*, 16, 29.

32 Margaret Mead and Rhoda Métraux, "The Image of the Scientist among High School Students: a Pilot Study," *Science* 126, 1957: 384–90.

33 See David Wade Chambers, "Stereotypic Images of the Scientist: The Draw-a-Scientist Test," *Science Education* 67, no. 2 (1983): 255–65.

34 See Heather Ellis, "Introduction: The 'Man of Science' as a Gendered Ideal," in *Masculinity and Science in Britain, 1831–1918. Genders and Sexualities in History* (London: Palgrave Macmillan, 2017), 1-17.

are often related to media portrayals of scientists.[35] For example, studies of representations of scientists in popular media have identified two common images: an absent-minded professor as a socially isolated man completely absorbed in his work, and a mad scientist with misguided or evil intentions.[36]

On closer inspection, Balthazar goes beyond the stereotypes. He does not wear a lab coat, nor is he an evil genius—quite the opposite, his science is there to help ordinary people. Indeed, he does not spend much time in the laboratory like a clichéd TV scientist does; instead he has a busy social life, enjoys travelling and sports, visits friends, goes to cafés and restaurants, etc. He usually only engages in science and innovation to help other people, and his altruism is often noted by scholars.[37] Thus, he is portrayed as an idealized citizen scientist, a humanist who is socially responsible as his work is driven by societal needs, not by scientific curiosity alone. This echoes some of the current real-world efforts to tailor innovation to address ordinary people's needs—for example, Doezema and Frahm (2023) report a recent "rise of a new governance rationality in technoscientific innovation which places society, its needs, and desires at the center of scientific and technological development."[38]

Balthazar is also—perhaps as a product of his time in 1960-70s Yugoslavia—a good socialist.[39] He does not seek profit: he never sells his inventions, but instead makes them widely available for free. He does not seem to care about patents or economic returns, and his innovations generally help the environment, ecology and people, not the economy or private businesses. Some scholars have noted how the cartoon's humanist values and narratives reflect the socialist politics of Yugoslavia at the time of its creation, which was common to other Zagreb school of animation cartoons, too.[40] Balthazar's science starts with a question from the public, so ordinary people frame the research questions he tackles. He is therefore fully embedded in his

35 Brewer, Paul and Barbara Ley, *Science in the Media: Popular Images and Public Perceptions* (New York: Routledge, 2021), 1-26.

36 See Matthew C Nisbet et al., "Knowledge, Reservations, or Promise? A Media Effects Model for Public Perceptions of Science and Technology," *Communication Research* 29, no. 5 (2002): 584–608.

37 See Scarpa, 7-20; Martina Plantak, "Odgojni i obrazovni sadržaji u hrvatskim crtanim filmovima" / "Educational Content in Croatian Cartoons," (Master's thesis, Juraj Dobrilo University of Pula, Croatia. 2021). Also see Vedrana Hvizdak, "Animirani film u Hrvatskoj" / "Animated Film in Croatia," (Undergraduate thesis, Josip Juraj Strossmayer University in Osijek, Croatia, 2022); and Sara Vujić Ferčić, "Zagrebačka škola crtanog filma" / "Zagreb School of Animation," (Undergraduate thesis, University of Zagreb, Croatia, 2022).

38 Tess Doezema and Nina Frahm, "The New Spirit of Technoscience: Recalibrating Symmetrical STS Critique," *Journal of Responsible Innovation* 10, no. 1 (2023).

39 Tatalović. "Science, Utopia, and Socialism in Yugoslav Animation: The Case Study of Professor Balthazar," *Alternator*, 2025.

40 Ibid. See also Morton, "Boomerangs and Bombs," 2020; Paul W. Morton, "The Zagreb School of Animation and the Unperfect," (PhD dissertation, University of Washington, US, 2018); Ajanović, "Little Man at the Turn of the Worlds," in *Propaganda, Ideology, Animation: Twisted Dreams of History*, ed. Olga Bobrowska, Michał Bobrowski, Bogusław Zmudziński (Kraków: AGH University of Science and Technology Press, 2019), 154–74.

society (Figure 1), and is not a separate, remote expert in an ivory tower.[41] As such he taps into ideas about better aligning research with societal needs[42] and engaging ordinary people with citizen science projects.[43] Thanks to these aspects of the series, he remains surprisingly relevant to contemporary discussions around science and research policy.[44]

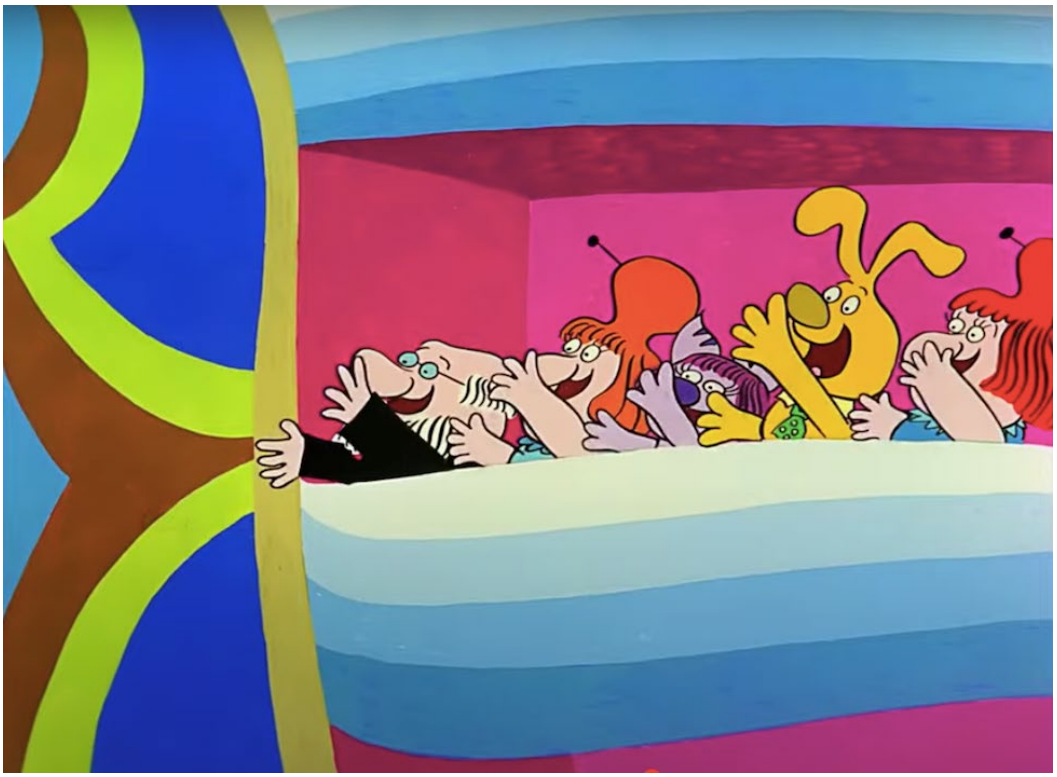

Figure 1. Balthazar in a theatre with friends. Credit: Professor Balthazar Association / Zagreb Film.

41 See Max Liboiron and Jenny Mollo, "We Need to Break Science Out of Its Ivory Tower—Here's One Way to Do This," *The Conversation*, April 25, 2017; Ashley Moses, "Dear Scientists, Come Down from Your Ivory Tower," *PLOS SciComm blog*, April 10, 2020.

42 David D Hart and Linda Silka, "Rebuilding the ivory tower: A bottom-up experiment in aligning research with societal needs," *Issues in Science and Technology* 36, no. 3 (2020): 64–70.

43 A. E. Sorensen and R. C. Jordan, "Framing impacts on citizen science data collection and participant outcomes," *Frontiers in Environmental Science* 12, no. 1496203 (2025): 1–9.

44 Mićo Tatalović, "Why Professor Balthazar is Still Relevant Today," *Research Professional News*, March 25, 2022.

Figure 2. Balthazar using his invention machine. Credit: PBA / Zagreb Film.

This analysis has also revealed further aspects that have not been previously noted in scholarly literature. One of them is the nature of Balthazar's inventiveness. He is usually presented as a successful genius who uses his colorful machine (Figure 2) to invent technological solutions to problems.[45] But in many episodes (15 out of 59), he does not invent anything. Also, some of his solutions involve simple, non-technical actions, such as talking to people or giving them a book. This reveals a sophisticated image of an erudite innovator, in which not every problem is met with a techy invention. Instead, some issues are dealt with using existing technology, such as radar, slide projectors, or motorized transport. Yet others are dealt with through human kindness, listening to the problems of others, and advising them what to do. This reinforces the nuanced image of a socially aware scientist attuned to the needs of the people, perhaps echoing socialist ideas about science and innovation[46] rather than a clichéd image of an absent-minded or mad genius focused on his own laboratory and inventions.[47]

Another overlooked aspect of *Professor Balthazar* is how it represents failure. Balthazar is usually described as a successful innovator, but this analysis reveals that he often fails. He makes errors in calculations, his "infallible theories" end up being wrong, his experiments fizzle out or end in explosions. He is also sometimes confused and does not know the answer to the problems that occur. At other times he is careless, for example falling asleep while his oven is on, causing a fire; or inventing a rainbow

45 See Plantak, 2021.

46 John Parrington, "Science, Socialism and the Russian Revolution," *International Socialism: A Quarterly Review of Socialist Theory* 155, 2017.

47 See Nisbet et al. 2002; Joachim Schummer, "Art and Representation: From the 'Mad Scientist' to Poison Gas and Chemical Pollution," in *A Cultural History of Chemistry in the Modern Age*, ed. Peter J. T. Morris (London: Bloomsbury, 2021), 203-23.

machine without anticipating how it will be affected by rain, leading to pollution.[48] Far from detracting from Balthazar's scientific credentials, such repeated instances of failure followed by perseverance to try new approaches reflect how real science and innovation work, where useful discoveries often come amidst "failures, errors, setbacks, and accidents" as noted by Makkar and colleagues (2023),[49] and can be useful for understanding the history and nature of scientific work.[50] Indeed, no single scientist or inventor could possibly exert full control over the universe, and real scientists also have "limited" control over the world, as Morton puts it,[51] so this aspect of Balthazar is quite realistic.

Such features of the cartoon point to an unusually contemporary and sophisticated representation of scientists, similar to that seen in the most recent independent films of the twenty-first century, which are often considered to be more innovative and critical of science than twentieth century productions.[52] Recent films often still depict scientists as white men who wear glasses, but they challenge other aspects of the traditional stereotype, such as wearing lab coats,[53] which is what we see in Balthazar as well. They are seen to move away from the common stereotype of a mad or dangerous chemist in a laboratory, and present greater diversity in the areas of specialization and behaviour of scientists, showing them as astronomers, climate researchers, particle physicists, mathematicians, etc.[54] Professor Balthazar himself embodies the diversity of science, doing work in a range of sciences, from astronomy and earth science, through to mathematics and veterinary science. Additionally, his personal life is presented as rich in diverse behaviours outside of the laboratory, such as partaking in sports, arts and crafts, theatre and music, competitions, and other fun leisure pursuits. *Balthazar* is also complex regarding the unintended consequences of scientific discoveries, and the adverse effects of technological developments on the environment, something that is often missing from many modern films about science.[55] With frequent depictions of failure, and with story plots involving unintended consequences, such as when mass production of an air filter invention leads to more air pollution in *Zrak / An Endless Deviltry* (Zlatko Grgić, 1978), *Balthazar* often explores the ethical, social and environmental implications of innovation.

48 Balthazar's innovation troubles were briefly mentioned by Morton in "The Zagreb School," 2018, 87, where he notes: "The new invention solves the problem, but not in the way Balthazar intended. Professor Balthazar is a controller, but only for one moment in any given short, and his control is limited."

49 Christina Makkar et al., "Science 'fails': A bank of historical examples for learning from failure in science," *CourseSource* 10, (2023): 1–12.

50 See Erica R. Hendry, "Seven epic fails brought to you by the genius mind of Thomas Edison," *Smithsonian Magazine*, November 20, 2013. Also see: Ann-Sophie Barwich, "The value of failure in science: the story of grandmother cells in neuroscience," *Frontiers in Neuroscience* 13, no. 1121 (2019): 1–12.

51 "The Zagreb School," 2018, 87.

52 Edite Felgueiras and Teresa Ruão, "Science on Screen: the Representation of Science in Independent Films," *Journal of Science Communication* 24, no 3 (2025).

53 Ibid.

54 Ibid.

55 Ibid.

BALTHAZAR AND THE ZAGREB SCHOOL OF ANIMATION

Many elements of *Professor Balthazar*'s storylines and character appear in the school's earlier cartoons, and possibly influenced the series.[56] Indeed, the very first animated film of the Zagreb Film production company was about a laboratory scientist and his inventions in *Nestašni robot / Playful Robot.*[57] A key trait of Professor Balthazar's behaviour—deep thinking while pacing left and right before coming up with a solution, and then jumping with excitement—is depicted in a girl scientist in *Krava na mjesecu / Cow on the Moon* (Dušan Vukotić, 1959) (Figure 3). Furthermore, his propensity for thinking, inventions and failure is also seen in the *Inspektor Maska / Inspector Mask* series (Dragutin Vunak, 1962-63), where a nerdy private detective, like Balthazar, solves problems thanks to his intellect, rather than physical strength or power,[58] but his ideas sometimes comically fail.

Figure 3. Scene from *Krava na mjesecu / Cow on the Moon*. Credit: Zagreb Film.

56 For example, we can see space imagery such as rockets, satellites or aliens in *AbraKadabra / Abracadabra* (Dušan Vukotić, 1957); *Krava na mjesecu / Cow on the Moon* (Vukotić, 1959); *Ring / The Ring* (Nikola Kostelac, 1959); *Dječak i lopta / The Boy and the Ball* (Boris Kolar, 1960); *Mali i veliki / Little and Big* (Zlatko Grgić, 1966); *I videl sem daljine meglene i kalne / Far Away I Saw Mist and Mud* (Zlatko Bourek, 1964), *Posjet iz svemira / A Visit from Space* (Grgić, 1964). Time travel appears in *Happy End* (Vatroslav Mimica, 1958), and the Stone Age world with dinosaurs living among cavemen appears in *Susret u snu*. Mathematical calculations and motifs appear in *Znatiželja / Curiosity* (Borivoj Dovniković-Bordo, 1966) and *1x1=1* (Zvonimir Lončarić, 1964), while in *Možda Diogen / Diogenes, Perhaps* (Nedeljko Dragić, 1967), we see complex geometry drawings and water marked by its chemical formula H_2O.

57 Ajanović, "Little Man," 2000.

58 Iva Pavlić, "Kriminalistički animirani filmovi nastali unutar Zagrebačke škole crtanog filma," / "Animated Crime Films Produced within the Zagreb School of Animation," (Master's thesis, University of Zagreb, 2022).

Such characters that resemble Balthazar in their intellectual pursuits abound, with other examples including *Jaje / The Egg* (Vatroslav Mimica, 1959), and *Koncert za mašinsku pušku / Concerto for Sub-Machine Gun* (Dušan Vukotić, 1958). However, they differ from Balthazar in that they are usually driven by selfish and/or evil motivations such as personal promotion or financial gain, hence evoking the cliché of a mad expert, such as Tony Cantare from *Inspektor maska: građanin IM-5 / Inspector Mask: Citizen IM-5* (Boris Kolar, 1962), a gangster-singer who designs a robot for criminal activities and programs it to be violent.

The comparison goes beyond the visual elements, too. The specific musical themes dedicated to Balthazar's thinking and inventing sequences which are consistent across episodes,[59] are part of the original and upbeat musical score developed by celebrated composer Tomica Simović, and considered to have played a big part in the series' success.[60] Such use of a dedicated musical theme for the thinking and invention segments was seen previously in some episodes of *Inspector Mask*.

I do not mean to suggest that any of the above consistent elements were invented by the Zagreb school, but simply that they were present in its work from the very beginning, and that we can see them develop and combine in *Professor Balthazar*, arguably its most famous and successful scientist character. But how do we explain the school's propensity for such themes, and links between the films? This article cannot answer this question fully, but will make some initial suggestions.

Literary and cultural theory of intertextuality suggests that all works are interrelated and are the result of the absorption and transformation of other works. [61] Some scholars have argued this is especially true of animation, where interconnectivity of works plays a creative role,[62] and animated films remain an active field of study for intertextuality.[63] Here, we can trace some of the possible influences on the school's work. For example, science and technology would have been widely present in the media at the time, especially given the geopolitical space race and fast technological progress in the Cold War era. Some scholars have also noted that the Zagreb school often satirized American movie genres including sci-fi,[64] which is where some of the scientific elements may have come from. Indeed, we see several such films made in the early days of the school, including *Ludo srce / A Crazy Heart*

59 Irena Paulus, "Animation Experienced through Music: Tomislav Simović and the Zagreb School of Animation," in *Global Animation Theory: International Perspectives at Animafest Zagreb*, ed. Franziska Bruckner, Nikica Gilić, Holger Lang, Daniel Šuljić and Hrvoje Turković (New York: Bloomsbury Academic, 2019).

60 See Paulus, 2019, 177–96; Višeslav Laboš, "Music and Sound in the Zagreb School of Animated Film," (Master's thesis, University of Zagreb, 2015).

61 María Jesús Martínez Alfaro, "Intertextuality: Origins and Development of the Concept," *Atlantis* 18, no. 1/2 (1996): 268–85.

62 Kelly L. Richardson, "'Simpsons Did It!': 'South Park' and The Intertextuality of Contemporary Animation," *Studies in American Humor*, no. 17 (2008): 19-34.

63 See Anna Wojciechowska-Pieszko, "Translating Intertextuality in Animated Films—an analysis of DreamWorks, Disney and Pixar animations," *Polonica* 42 (2022): 5-28; Rebeca Cristina López González, "The Art of 'Including Art' in Animation: DreamWorks' Intertextual Games for All," *Journal of Literary Education* (2018): 1-12.

64 Turković, 2012, 204. See also Pata, 2007, 17, 23, 142.

(Nikola Kostelac, 1959), *Bijeli miš / The White Mouse* (Ivo Vrbanić, 1961), and *Astromati / Astromutts* (Dušan Vukotić, 1963).

It is also evident that some of the school's celebrated animators had a longstanding interest in science. For example, Boris Kolar notes early influences such as a film about Thomas Edison and his haphazard chemical experiments, and his own childhood play using chemistry for making gunpowder to produce colorful flames.[65] Dragutin Vunak cites the famous inventor Leonardo da Vinci as playing a "crucial role" in his life.[66] And Dušan Vukotić was glued to the TV during the Moon landings in 1969, and joked that he had "launched his *Cow on the Moon* a full ten years earlier."[67] Kolar[68] and Vukotić[69] were also outspoken about the promise and underutilization of animated films in science popularization and education, a topic that was being discussed by both them and film critics[70] in the 1950s and 1960s. Alongside the fictional animations that featured scientific themes, Zagreb Film also made several educational popular science films in those years,[71] about space, mathematics, and health.[72]

Grgić and Kolar, two of the three main authors behind *Balthazar* also made other science and inventor-themed films in the preceding years. Indeed, Grgić's very first directing credit was for *Posjet iz svemira / A Visit from Space* (1964),[73] which won first prize in a science fiction film festival in Trieste in 1966.[74] He then made *Đavolja posla / Devil's Work* (1965), about a man dabbling in mysterious chemical experiments at home. Kolar, meanwhile, "attracted notice with the brilliant *Otkrovitelj / Discoverer*" in 1967-68,[75] and co-directed *Stručnjaci / The Specialists* in 1968,[76] in which some of the technical expert characters and their contraptions are reminiscent of those seen in the *Balthazar* series.

The Zagreb school's authors influenced each other as many films were collaborations of two or more of them working on different tasks, and there was mentorship of younger team members.[77] Ajanović notes that "Authors exchanged

65 Boris Kolar, *Sjećanja i razmišljanja jednog Zagrepčanca* (Zagreb: Udruga Profesor Baltazar, 2016), 15-17.

66 Nenad Pata, *A Life of Animated Fantasy* (Zagreb: Zagreb Film, 1984), 49.

67 Ibid, 178-79.

68 Cited in Ranko Munitić, *Zagrebački krug crtanog filma 3–Uspjesi i nedoumice*, ed. Zlatko Sudović (Zagreb: Zavod za kulturu Hrvatske – Zagreb Film, 1978c), 101, 150-51.

69 Ibid, 56, 137.

70 Ibid, 34.

71 These included films such as *Ipak se kreće / Eppur si Muove* (Vunak, 1957), part of the instructional series called *Svemir, zemlja i mi / Universe, Earth and Us*; *Put u svemir / The Flight into Space* (1958), the studio's first attempt at the educational-instructional film genre; and *Čovjek i njegov svijet / Man and His World* (1967), which involved *Balthazar* authors Grgić and Zaninović. The school also made *Jednakost mnogokuta* (Darko Gospodnetić, 1962) and *Neman i vi / The Monster and You*, a film about tuberculosis for the World Health Organization (Kolar, 1964).

72 See Munitić, *Zagrebački krug crtanog filma 1*, 1978, 183, 193.

73 Bendazzi, 265.

74 Munitić, *Zagrebački krug crtanog filma 1*, 1978, 193.

75 Bendazzi, 2017, 272.

76 Pata, 1984, 107.

77 Marinić, 2014, 14.

ideas and experiences, learning the tricks of the trade, and influencing each other at the same time."[78] Holloway notes links between *Krava na mjesecu* and *Posjet iz svemira*, both involving Vukotić.[79] Also, some of the team members working on the school's science-themed films were the same: a notable example is Zlatko Bourek and Boris Kolar working together on *Nestašni robot* and later on *Professor Balthazar*.

While I do not investigate Zagreb Film's later productions in any detail, it is worth mentioning that both the scientific motifs[80] and the intertextual elements of *Professor Balthazar* can be seen in the school's later work, too, even in some recent productions.[81] This is perhaps not surprising given the continuities in style and staffing[82] of the studio, even across otherwise very different historical periods.[83] This also reinforces the argument that such imagery was a part of the wider repertoire of the Zagreb animators over decades, as we will see in the next section.

SCIENCE IMAGERY, THINKERS AND SCIENTISTS

In *Đavolja posla / Devil's Work* (1965), a young man uses a chemistry set at his home, without protective equipment, to make a potion that makes him more confident (Figure 4). One complex piece of equipment we see in a book he uses works by distilling a red droplet of solution. Despite these similarities to Balthazar's work, this man evokes the 'mad alchemist' cliché and is less realistic.[84] Science is presented as a recipe from a magic book, having instant supernatural effects. It suggests the existence of a secret formula that inexplicably changes human behaviour, and

78 Ajanović, 2025, 19.

79 Holloway, 1972b, 59.

80 For example, motifs such as learned men reading books, and mathematical and high-tech imagery appear in *Rotatori / Rotators* (Tomislav Findrik, 2007), *Fantastična odiseja doktora Zodiaka / Doctor Zodiac's Fantastic Odyssey* (Matija Pisačić, 2009), *Wizard of Oz—The fish incident* (Tom Jantol, 2009), *Čudnovati izum / Strange Invention* (Dino Krpan, 2010), and *Akceleracija / Acceleration* (Andrej Rehak, 2010). We see space travel in *Film s djevojčicom / A Film With a Girl* (Daniel Šuljić, 2000), and *GIG—Put do zvijezda / GIG—Road to the Stars* (Hrvoje Habljak and Mislav Tomašinjak, 2010); and in *Cigla / The Brick* (Dubravko Mataković, 2012), where aliens arrive on a spaceship that looks like a flying wood stove, reminiscent of the washing machine spaceship seen in *Professor Balthazar*.

81 Some of the explicit references pay homage to Balthazar, for example in *Note / Tones* (Marko Meštrović, 2008), a child's room is adorned with unobtrusive portraits of Professor Balthazar, serving as a backdrop for the cartoon's own, unrelated storyline, and embedding Balthazar as part of popular culture. Others are used as a vehicle for humour, for example in *Utakmica / The Game* (Krešimir Zimonić, 1987), a rooster unexpectedly goes to think through a problem like Professor Balthazar, pacing left and right in the same curtain-draped room until he finds a solution. Intertextual elements also include musical themes, for example the opening credits of *Plodovi suše / Dry Season Fruits* (Dinko Kumanović, 2021) feature music from the opening credits of *Professor Balthazar*. Implicit references include the learned men who look like Balthazar, such as the school professor in *Palčić / Tom Thumb* (Milan Blaženković, 1980) or the scientist in *Hot Stuff* (Zlatko Grgić, 1971).

82 Turković, 2012, 181.

83 See Marinić, 2014, 30-34, 94, 96-97.

84 See Schummer, 2021.

conflates science with wizardry, evoking the pre-twentieth century stereotype of the "harmless eccentric" dabbling in "alchemy and black magic"[85] together with the clichéd image of an (al)chemist looking at a flask.[86]

Figure 4. Scene from *Đavolja posla / Devil's Work.* Credit: Zagreb Film.

Another example is Doktor Sinus, from *Djevojka za sve / All-Around Help*, who works in a big laboratory with a backdrop of colorful chemistry equipment and robot drawings (Figure 5). Much of his equipment and parts of the storyline anticipate *Balthazar's*,[87] but Sinus is a simpler and more stereotypical character: he wears a lab coat and safety glasses, spends most of his time in the laboratory, and is endlessly distracted by his experiments. So, he is portrayed as a mad scientist working away in his ivory tower,[88] too busy even to properly fix the malfunctioning robot that keeps interfering with his work.[89]

85 David Wade Chambers, "Stereotypic Images of the Scientist: The Draw-a-Scientist Test," 1983.

86 Joachim Schummer, "Art and Representation: From the 'Mad Scientist' to Poison Gas and Chemical Pollution," 2021.

87 One piece of his equipment looks like a simpler version of Balthazar's invention machine: a round container with a tap that leads into a flask. We also see some motifs such as a diving helmet similar to Balthazar's diving suit in *Neman Fufu / Vanilla Monster* (Ante Zaninović, 1977) and in *Veseli Most / Big Sawpuzzle* (Boris Kolar, 1977), or his space ship, anticipating Balthazar's in *Zvjezdani kvartet / Starlight Serenaders* (Zlatko Grgić, Boris Kolar, and Ante Zaninović, 1968). Also, Sinus' experiment ends up in an explosion that gets him all bandaged up in a hospital bed, which is exactly what happens to Balthazar in the pilot episode.

88 For example, see Joachim Schummer, "Art and Representation: From the "Mad Scientist" to Poison Gas and Chemical Pollution," 2021.

89 Dystopian themes of unruly robots return in Zagreb Film's more recent work, too, for example in *Tajni Laboratorij Nikole Tesle / Nikola Tesla's Secret Laboratory* (Bruno Razum, 2014).

Figure 5. Scene from *Djevojka za Sve / All-Around Help*. Credit: Zagreb Film.

Finally, *Nestašni robot / Playful Robot* features a deep-thinking scientist who builds robots in a huge laboratory (Figure 6). Like Balthazar, he is surrounded by books and mathematical equations, and he pulls a lever to start a complex invention machine that produces a red droplet. While the imagery is similar, it is more stereotypical: the laboratory is unrealistically vast, and the lab-coat-wearing grumpy scientist is working alone on a vanity project to make helper robots for himself. The cleaning automaton in *Nestašni robot / Playful Robot*, which is literally heartless (there's a hole in his body where the heart would be), misbehaves and makes ever more mess until the human wakes up and fixes the situation; similarly, in *Djevojka za sve / All-Around Help*, the helper robot malfunctions, leading to the human protagonist's defeat. Both films present a critique of robotisation[90] and question the ethics, accountability and impact on the workforce that remain relevant today with the advent of artificial intelligence.[91] These films broadly follow the trend of science fiction work in the 1950s and 60s that saw "considerable hope in technology" at the same time as presenting "fear of dehumanization" from automation and fears of humans being made redundant by machines.[92]

90 The main theme of *Nestašni robot / Playful Robot* is an "ironic sneer at the mania of automatization", according to Višeslav Laboš, "Music and sound in the Zagreb School of Animated Film," 2005.

91 Vincent C. Müller, "Ethics of Artificial Intelligence and Robotics," in *The Stanford Encyclopedia of Philosophy*, eds. Edward N. Zalta and Uri Nodelman. Metaphysics Research Lab, Stanford University, Fall 2025.

92 Daniel Chandler, "Imagining Futures, Dramatizing Fears: The Portrayal of Technology in Literature and Film," web document, http://visual-memory.co.uk/daniel/Documents/SF/, published 1994, last modified September 12, 2020.

Figure 6. Scene from *Nestašni Robot / Playful Robot*. Credit: Zagreb Film.

In contrast to these earlier Zagreb school films, Professor Balthazar deploys automation to help others rather himself, and humans come out on top.[93] But the series, too, views automation with suspicion when its motivation is not humane. For example, in *Zvonko sa zvonika / Steeples are Funny* (Kolar, 1971), a character in charge of a bell tower gets replaced by a robot because he avoids hurting a bird that lands on the mechanism: "he is deemed a bad worker and therefore replaced by a machine," Scarpa explains (2011).[94] But unlike the worker, the new machine is insensitive to living creatures and is depicted as a menacing cog personifying the dread of the technological change,[95] which I discuss further in the next section.

RECURRENT MOTIFS AND ELEMENTS: AMBIVALENT TECHNOLOGICAL MACHINES

Complex technological machines are a common motif in the school's cartoons, often as symbols or instruments of oppression. Such is the giant mechanical horse in *Krotitelj divljih konja / Tamer of Wild Horses* (Nedeljko Dragić, 1966), where the mechanism is crushing the main character, which Ajanović (2000) describes as "a

93 For example, he modernises a craftsmen's workshop with an automated system, allowing the workers to rest more; and his ice cube machine, the "snow-o-mat" invented for polar bears allows the zoo-keeper to take naps at work—the machine "made life much more pleasant" for him, the narrator says.

94 Scarpa, 12.

95 Ibid.

humorous anecdote about a highly technological society and the increasing alienation in which people live."[96] Similarly, in *Samac / Alone* (Vatroslav Mimica, 1958), a film that examines the "terror of modern life,"[97] an office worker is surrounded by colorful clockwork-like machinery, which closes in on him, eventually crunching him. Another example is *Perpetuum & Mobile Ltd.* (Vatroslav Mimica, 1961), which features a "vision that develops into a nightmare" as a factory machine turning out screws also turns workers into screws by the same process.[98] Holloway (1972) states that such films presented a view of "man in a dehumanizing environment" while "deploring the ultimate absurdity of industrialization."[99] He argues that the animators' aim was to bring hope into "the despair of an industrialized, dehumanized society."[100]

Such depictions broadly follow general trends in film at the time, and Chandler (1994) notes that computers and robots were frequently interpreted in film and literature as a threat to humanity in 1950-60s, and that with time, in the 1970s there was a shift from a "concern with adapting technology to human purposes to a concern with the more problematic issue of human adaptation to technological environments."[101] More specifically, in the Yugoslav political environment, scholars have noted that the country's "humanist socialism" philosophies influenced how the school's films approached these topics,[102] so that they aimed to "humanize the technology, rather than technologise the human"[103] at a time of rapid technological progress in the mid and second part of the twentieth century.

This meant that the school's topics often revolved around the 'small' or 'common' man and his troubles, especially as caused by modernity and technology.[104] Ajanović (2000) notes the school's films focusing on "individuals lost and trapped in ever-more urbanized cities, frustrated and scared of their hyper-mechanised surroundings," pointing out that many of the films used a metaphor of the brave and optimistic "small man" facing injustice and animosity in their surroundings.[105] Similarly, Morton (2018) says that the school's animators were beset by concerns of "dehumanization via technology" and he discusses the cartoons about the "alienating effects of technology" and the characters being "robbed" of their humanity.[106]

Professor Balthazar stands in stark contrast to such films, as one of the main repeated images is that of his "miraculous machine," which he pulls a lever on to start

96 Ajanović, Midhat Ajan, "Little Man at the Turn of the Worlds," 2000, 151.
97 Paul W. Morton, "The Zagreb School of Animation and the Unperfect," 2018, 169.
98 Ronald Holloway, "Zagreb: Yugoslav Animated Film," *Take One Magazine* 3, no 5 (1972): 9-12.
99 Ibid.
100 Ibid.
101 Daniel Chandler, "Imagining Futures, Dramatizing Fears: The Portrayal of Technology in Literature and Film," 1994.
102 Ibid.
103 Paul W. Morton, "The Zagreb School of Animation and the Unperfect," 2018, 5.
104 Ajanović, Midhat Ajan, "Little Man," 2000.
105 Ajanović, Midhat Ajan, "Little Man," 2000, 149.
106 Ibid.

a cheerful and colorful process of invention that usually leads to happiness and harmony. Similar complex contraptions operated by the pull of a lever appear in the school's other cartoons but rarely lead to such easy and positive outcomes.[107] A key difference is that Balthazar was intended for children, so perhaps this is why it presented a gentler, more hopeful view of technology.[108] A similar upbeat view of technology is also seen in *AbraKadabra* (Vukotić, 1958), which won a *Kekec* educational award at the Pula Film Festival in 1959 as a film recommended to children and young people.[109] It features a playful competition between an older character, a wizard enamoured with magic and tradition, and a younger one, a boy who embraces modernity and technology. It continually shows modernity and progress, with imagery such as rockets and space travel, winning over tradition and old ways of doing things. Other notable films for children from that time also had this softer, simpler view of technological progress, such as *Krava na mjesecu / Cow on the Moon* and *Mali vlak / A Little Train* (Vunak, 1959).

Such techno-optimism raises questions for future research about technological determinism[110] within the school's work aimed at children, especially as contrasted with the more dystopian depictions aimed at adults. Future work also could look in more detail at how and why the school's representations of science and technology changed in different films and over time, and possibly link it to the wider trends in science, media and politics. For example, the different representations of new technology and its effects could perhaps at least somewhat be explained by the socio-economic circumstances in Yugoslavia at the time. The country was booming economically in the 1950s and 1960s, possibly partly as a result of technology adoption, with the period being described by some scholars as the "heyday of market socialism"[111] and the "Yugoslav economic miracle."[112] Chandler (1994) notes that periods of "economic booms, stimulating technological developments, seem to be associated with waves of enthusiasm" about the portrayal of technology in literature and film.[113] This would have been contrasted by the school's humanist focus on ordinary people, so the new technology could have been seen by artists as being

107 For example, in *Krađa dragulja / Theft of Jewels* (Mladen Feman, 1959), *Don Kihot / Don Quixote* (Vlado Kristl, 1961), *Bumerang / Boomerang* (Kolar, 1962*), Bila jednom jedna točkica / Once Upon a Time There Was a Dot* (Mladen Pejaković, 1964), *Krava na granici / Cow at the Border* (Vunak, 1963).

108 Critics at the time often complained that the Zagreb school's films were targeted too much at the intellectual international film festival audiences, instead of local people and especially children; and even some animators such as Kolar admitted there was a need for more animated films aimed at children, as documented in Munitić, *Zagrebački krug crtanog filma 3*, 1978, 34, 150-51.

109 Munitić, *Zagrebački krug crtanog filma 1*, 1978, 144.

110 See Sally Wyatt, "Technological Determinism: What It Is and Why It Matters," in *Technology Ethics* (Routledge, 2023).

111 Leonard Kukić, "Socialist growth revisited: insights from Yugoslavia," *European Review of Economic History* 22, no. 4 (2018): 403–29.

112 Marie-Janine Calic, "After the Boom Years (1971 to 1980)," in *History of Yugoslavia* (West Lafayette: Purdue University Press, 2019), 240-48.

113 Daniel Chandler, "Imagining Futures, Dramatizing Fears: The Portrayal of Technology in Literature and Film," 1994.

ambivalent at that time in Yugoslavia: economically positive but also negative when it came to its effects on daily life as the country was modernising and changing rapidly, disrupting tradition and routines as depicted in *AbraKadabra* and *Mali vlak / A Little Train*. Towards the end of the 1970s, Yugoslavia's economic miracle started to fade,[114] and an over-complex socio-economic bureaucracy driven by complex political needs was starting to set, leading to economic downturn and political upheaval that resulted in its eventual disintegration in the 1990s,[115] perhaps contributing to the more suspicious view of innovation and technology we see in some episodes of *Professor Balthazar* such as *Zrak / An Endless Deviltry*. That episode portrays the limits of an individual inventor against environmental degradation and the wider socio-economic system, leaving viewers with a "stern warning" about the future of humanity as a giant smog monster engulfs Balthazartown.[116]

Several other cities in former Yugoslavia also had film studios that produced animations in the 1960-70s,[117]such as Belgrade's Dunav Film, Skopje's Vardar Film, or Ljubljana's Viba Film— some of them also containing scientific ideas and technological motifs,[118] so another avenue for future research could be to analyse their work and compare it with the Zagreb school's films— especially as some of the authors in those other studios also collaborated with the Zagreb school and would have been exposed to the school's ideas.[119]

CONCLUSION

In this article, I have introduced the famed Zagreb School of Animation in its 'golden age' by looking at its science-themed films, which have rarely been discussed in scholarly literature. I have analysed how its most famous and successful scientist character, Professor Balthazar, represented the world of science. The overall image of a scientist that emerged from the series is one of a fallible human with mundane interests outside the laboratory, who excels in research and technology but also faces struggles and setbacks, and whose discoveries, while often useful, also sometimes cause unintended and unwanted consequences. As such, this cartoon which was conceived of and first made in the 1960s, is unusually contemporary and sophisticated in its depictions of science and innovation, and thus remains relevant to ongoing scholarly and public discussions of science in society.

I traced some of the science-related elements of this cult cartoon back to the

114 Saul Estrin, "Yugoslavia: The Case of Self-Managing Market Socialism," *The Journal of Economic Perspectives* 5, no. 4 (1991): 187–94.

115 Marie-Janine Calic, "After the Boom Years (1971 to 1980)," 2019.

116 Scarpa, 2011, 20.

117 See Munitić, *Zagrebački krug animiranog filma 4*, 1986, 438-43.

118 Examples include *Phoenix* (Branko Ranitović, 1963); *Pardon* (Nikola Majdak, 1966); *Aplauz / Applause* (Radivoje Ivanović, 1968); *Ostrvce / The Island* (Branko Obradović, 1970); *Embrio No. M* (Petar Gligorovski, 1971); *Detelj̆cek / Woodpecker* (Martin Pindarić, 1973).

119 See Munitić, *Zagrebački krug animiranog filma 4*, 1986, 438-43.

rich opus of films that the school made in the dozen or so years before, arguing that many of the key elements that later featured in the successful series had already been used in the school's previous animations. I noted and described various similarities and differences in the representations of science in these films, showing how Balthazar may have emerged from the school's previous work, and related this rich interest in science and innovation to popular culture at the time, as well as the interests of individual artists. I also traced the school's complex and ambivalent relationship with new technology, which features frequently in *Professor Balthazar* and other films, and placed it in the context of culture and politics at the time, as well as different audiences.

Overall, this analysis suggests that Professor Balthazar as a character, scientist and inventor, has a long and so-far untold backstory in the worlds created by other cartoons from the Zagreb School of Animation. Those worlds were likely inspired by popular culture and science of the time the animators grew up in and in which the school came about. Those films often featured imagery of science and complex technological machines, as well as themes of brilliant inventors struggling with automation and modern technologies, and experiencing a mix of success and failure. Many of those elements later came together in the whimsical world of the school's longest-running and most successful series in which the main character is a scientist-inventor, Professor Balthazar. He is similar to those predecessors, but also less stereotypical, presenting a more realistic image of a scientist. And while *Professor Balthazar* continued with the tradition of portraying the challenges of the modern world and possible failures of innovation, it also shifted the narrative away from technology as being mainly oppressive and moved it towards being a more positive development, encapsulated in his magical invention machine whose innovations repeatedly made people happier. ⊡

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