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Children's experiences with a transmedia narrative: Insights for promoting critical multimodal literacy in the digital age

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ABSTRACT

Children's engagement with transmedia narratives, where the same story is presented through different media such as book, film and interactive app, can reveal their knowledge about different modes, media and software for multimedia authoring. Such insights provide a suitable starting point for developing effective approaches to critical multimodal literacy education in the digital age. Specifically, they can inform decisions about which concepts and frameworks for the critical multimodal analysis of texts and digital technologies to adapt for use with young learners. We advance this argument through a case study comprising:

- the transmedia narrative *The Fantastic Flying Books of Mr Morris Lessmore* in its film (Joyce and Oldenburg, 2011), interactive app (Moonbot Studios, 2011), and traditional picture book (Joyce, 2012) formats;
- observations of mothers and their 4–5-year-old children's interaction with the book and the app;
- a comic strip and a LEGO animation created respectively by a 7-year-old (Oskar) and a 10-year-old (Ollen), which represent a scene from that narrative; and.
- an interview with Ollen about his experience of making the animation with the software tools Stop Motion Studio and GarageBand '08.

The case study's findings reveal:

- preschool-aged children's awareness of media affordances and semantic patterns in narrative.
- the older children's understanding of narrative conventions and capacity to construe broad social themes by selecting the most apt semiotic resources available in their chosen media.
- the ways both familiarity with different digital semiotic technologies and non-digital resources (e.g. LEGO) and a software's design can shape a child's multimedia authoring.

Drawing on these findings, we argue that observations of children's experiences with transmedia narratives provide a suitable starting point for developing effective approaches to critical multimodal literacy education in the digital age. We posit that such observations can help educators consider which concepts and frameworks for the critical multimodal analysis of texts and digital technologies to adapt for use with young learners in the classroom. This necessarily involves examining continuity and change across old and new technologies and semiotic practices.

1. Introduction

Digital artefacts such as interactive picture book apps and software for designing multimedia provide children with opportunities to experience transmedia storytelling – to engage with or create stories across different media such as film, book and interactive app. Children's experiences with transmedia narratives offer valuable ideas about how multimodality theory and frameworks for multimodal analysis can inform the development of critical multimodal literacy pedagogies in the digital age. Such pedagogies aim to build knowledge of the affordances of different media (material resources and channels of communication) and the meaning-making potential of the modes (e.g. layout, sound, writing) these media support. Key to achieving this aim is giving

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young learners' tools for analysing and discussing how the (co)deployment of different semiotic resources can privilege some social and cultural practices and values over others.

Advances in digital technologies and observations of children's meaning-making have motivated new directions in both research on multimodality and literacy education. Kress and van Leeuwen (2001) argued that the possibility that one person could manipulate and combine different semiotic resources using the same digital interface calls for a new turn in theorising multimodality. Complementing work on individual semiotic resources, such as visual design (Kress and Van Leeuwen, 2006 [1996]) and sound (Van Leeuwen, 1999), they emphasised the value of identifying multimodal meaning-making principles (including 'genre', 'salience', 'framing', 'style' and 'cohesion') that operate within and across different modes, media and communication practices (Kress and Van Leeuwen, 2001; Van Leeuwen, 2005).

And at least a decade before children's access to digital technologies became commonplace, Kress (1997) noted: "in learning to read and write, children come as thoroughly experienced makers of meaning [. . .] in any medium that is to hand [. . .] toys and constructions of various kinds; Lego blocks; cardboard boxes; blankets; chairs; corners of rooms; pens and paper; scissors; paste and paper; and so on" (p. 8). Like all meaning-makers, he explained, children *make* signs by selecting from the resources available to them those that are *apt* for expressing the meanings that reflect their *interests* in particular social contexts. He illustrated the non-arbitrary nature of signs with his three-year-old child drawing circles to represent a car (Kress, 1993). These observations informed Kress's (2010) influential social semiotic theory of multimodality. They also resonate with New London Group's (1996) manifesto 'A Pedagogy of Multiliteracies'. The manifesto argued that the goal of literacy education is to transform social futures by equipping all students to successfully negotiate both the "burgeoning variety of text forms associated with information and multimedia technologies" and "the cultural and linguistic diversity of globalised societies" (p. 61).

In this article, we argue that studying children's experiences with transmedia narratives across digital and traditional media provides valuable insights for developing effective pedagogies for promoting critical multimodal literacy in the digital age. Such insights can inform the selection and adaptation of frameworks for studying multimodality that (i) build on the 'funds of knowledge' (Moll et al., 1992) students bring to the classroom, (ii) allow teachers and students to analyse and discuss how various semiotic resources contribute to semantic patterns that construe social themes in various types of texts across different media, and (iii) draw attention to the unique affordances of digital technologies and how they recontextualise non-digital semiotic resources and practices. In support of our argument, we employ a case study comprising:

- the transmedia narrative *The Fantastic Flying Books of Mr Morris Lessmore* in its film (Joyce and Oldenburg, 2011), interactive app (Moonbot Studios, 2011), and traditional picture book (Joyce, 2012) formats;
- observation notes from the joint interactions of mothers and their 4-5-year-old children with the book and the app;
- a comic strip and a LEGO animation created respectively by a 7-year-old (Oskar) and a 10-year-old (Ollen), which represent a scene from that narrative; and
- an interview with Ollen about his experience of making the animation with the software tools Stop Motion Studio and GarageBand '08.

For brevity, we refer to the narrative as *Morris Lessmore* and these different versions as 'book', 'app', 'film', 'comic' and 'animation'.

In line with the goals of this special issue of *Discourse, Context and Media*, the case study invites us, as multimodal discourse analysts, to carefully consider whether, which and how tools for linguistic analysis can be adapted to multimodal texts, and to examine both continuities and transformations in the construction of certain meanings across versions of the same story that employ different modes and media. In this way, it steers us away from a priori drawing ungrounded distinctions between digital and non-digital texts, media and semiotic practices.

The case study reveals children's funds of knowledge about the affordances of digital and non-digital media and the semiotic resources and practices they support. In this way, the case study represents an important first step towards designing effective critical multimodal literacy pedagogies. By taking this step, we seek to bridge and build on the strengths of studies of young learners' digital literacy practices and research into explicit critical multimodal literacy pedagogies. Prior to presenting our case study, therefore, we review these two strands of research and briefly consider why transmedia narratives provide a suitable ground for learning about, and further extending, children's awareness of different modes and media.

2. Explorations of young learners' digital literacy practices

Young learners' digital practices in both formal and informal educational contexts have attracted considerable scholarly attention. Studies of home-based digital literacy in early childhood, reviewed by Kumpulainen and Gillen (2019), have highlighted: the role of parental mediation (e.g. parents providing or restricting children's access to digital technologies, helping children learn how to operate these technologies, and engaging in these practices jointly with their children); the relations between children's offline and online practices; and the disconnect between their home and school-based digital practices. Yet, little is known about "how children's digital literacy practices can further their capacity to ask questions about power, about intended audience and about reception" (Kumpulainen and Gillen, 2019, p. 12).

Numerous empirical studies of young learners' digital practices adopt a multimodal perspective, and many propose new multimodal methodologies for observing, documenting, and analysing these practices (on researching and theorising children's digital literacy see Erstad and Gillen, 2019; Poveda, 2019). Many of these studies are informed by two dominant approaches to multimodality (identified in Jewitt, 2014): the interactional and the social semiotic. Drawing on ethnomethodology, conversation analysis and mediated discourse analysis, the interactional approach supports detailed accounts of situated interactions. For example, Aarsand and Melander's (2016) compared four 6–7-year-old children's participation in word processing at school and online calling at home. Their study revealed that familiarity with old media (e.g. paper, photo camera), alongside verbal, embodied, and social resources, shapes the knowledge children, in interaction with adults, develop about how to participate appropriately in such mundane digital practices. It also showed that children vary in the knowledge about digital media they bring to the classroom, despite basic skills in using digital technologies being taken for granted. Using digital ethnography, Dezuanni (2018) studied children's engagement with *Minecraft* as an 'assemblage' comprising the players, the digital platform (especially *Minecraft*'s rules for building and playing), the devices, and the spaces of this practice (which includes schoolyard or family talk about *Minecraft*). Dezuanni (2018) argued using 'assemblage' as the unit of analysis (rather than 'text' or 'media') affords deeper insights into "the everyday, or vernacular, media literacies assembled by children on digital platforms like *Minecraft*" (p. 246).

Studies adopting a social semiotic approach focus on the meaning-making potential of different semiotic resources and

their use, which always reflects individual, institutional and broader social and cultural values. Burn (2016), for instance, examined the use of visual design, music, voice acting, story-writing, and animation in a collaborative project in which 30 11-year-old primary school students designed a 3D machinima-style animation with the software Moviestorm. The study showed children extending their existing knowledge of both traditional film, theatre, and narrative conventions and the distinctive affordances of digital media. For Burn, these observations exposed the need for a multimodal pedagogy that can connect disciplines such as media, literacy, music, drama, computer science, and art with each other and with children's media cultures and creative practices.

Combining an interactional approach with a social semiotic focus on specific semiotic resources, Gilje (2011) examined in situ how three secondary school students discussed and used filters and layers when editing a video with the software *Final Cut Express*. The study demonstrated the software tool's role in modulating students' ideas about and use of film genre conventions and emphasised the need to recognise the norms and learning opportunities built into digital tools for authoring multimedia.

In sum, studies of young learners' digital literacy practices highlight their diverse and complex experiences with different media and semiotic resources, and the need to examine the technologies their practices involve. These studies also make recommendations for developing multimodal literacy pedagogies that harness children's existing funds of knowledge. They, however, direct little attention towards guiding children to learn about the affordances of digital media and about the ways specific semiotic resources contribute to the construal of social themes in multimodal texts, in contrast to the research we consider next.

3. Research into explicit critical multimodal literacy pedagogies

The concept of 'multimodal literacy' is grounded in the premise that communication is always multimodal – "meanings are made, distributed, received, interpreted and remade in interpretation through many representational and communicative modes" (Jewitt and Kress, 2003, p. 1). Following van Leeuwen (2017), "multimodal literacy is the ability to use and combine different semiotic modes in ways that are appropriate to the given context", it requires "knowledge of what can be done with different semiotic modes and how" and "an ability to creatively respond to the unique demands of specific situations" (p. 18). This involves not only awareness of the distinct affordances of different media (the materiality and channels of communication) and the semiotic potential of the modes they support (e.g. recognising that moving images are more apt than writing for representing movement and spatial relations). It also requires familiarity with the multimodal meaning-making principles that operate across modes and media. Multimodal literacy is a form of critical literacy, too; becoming multimodally literate entails attending to the norms that govern communication in different contexts and authorial decisions in multimodal texts, and recognising the social values they reflect (Lim, 2018; O'Halloran et al., 2017; van Leeuwen, 2017).

A critical multimodal perspective is especially important to adopt "in relation to the way technological tools favour certain forms of discourse" (van Leeuwen, 2017, p. 22). Ubiquitous software for media and text production and social media platforms, unlike earlier technologies such as the typewriter, not only offer a wide range of semiotic resources but come with built-in regimes that regulate how these resources should be (co)deployed in particular semiotic and social practices (Djonov and Van Leeuwen, 2018a). Such regimes promote the values of the global corporations that profit from these technologies. For example, bullet points reflect PowerPoint's origin as a tool for pitching ideas to management. Despite PowerPoint's wide adoption in education and the inadequacy of bullet lists for presenting complex arguments, bullet lists appear by default when one starts typing in the body of a slide even in the tool's latest versions.

The concept of critical multimodal literacy harks back to Halliday's (1978) theory of language as a social semiotic – the foundation for social semiotics as a broader, critical theory of multimodality (Hodge and Kress, 1988; Kress, 2010; Van Leeuwen, 2005) – and his systemic functional linguistics (SFL) (Halliday and Matthiessen, 2004). Central to Halliday's theory are its focus on meaning, view of language as one among many resources for making meaning in society, and model of the dynamic relation between language and social context. Following this model, language evolves in response to its users' needs and interests, which are reflected in three broad types of meaning people make in every act of communication (also known as 'metafunctions'): *ideational* – construing patterns of experience and logical relations between them; *interpersonal* – enacting and negotiating social relations and attitudes; and *textual/compositional* – creating cohesion and coherence. SFL frameworks for analysing grammar as well as discourse patterns beyond the clause such as genre (Martin and Rose, 2007 [2003], 2008) have inspired frameworks for analysing resources other than language, such as Kress and Van Leeuwen's (2006[1996]) *Grammar of Visual Design,* visual-verbal relations (e.g. Unsworth, 2006) and multimodal texts (e.g. O'Halloran, 2004).

Systemic functional multimodal theory, which tends to be informed by analyses of texts and interactions rather than of semiotic practices, has been adopted for the development of explicit approaches to teaching and assessing critical multimodal literacy. Pioneered by Unsworth (2006), these approaches offer teachers and students "a metalanguage for talking about language, images, sound, and so forth [as] a means of comparing texts, of determining what semiotic choices were made in constructing particular meanings, what alternatives might have been chosen, and the effects of particular choices rather than others" (Unsworth, 2014b, p. 38). Their typical point of departure is identifying which systemic functional concepts can help address particular curriculum outcomes (e.g. reflecting on visual-verbal relations in text or attitude in persuasive texts). Some studies illustrate the value of these concepts for literacy education using sophisticated analyses of multimodal texts. For example, Unsworth and colleagues (Barton and Unsworth, 2014; Unsworth, 2013, 2014a) compare interpersonal meanings in a picture book and a film version of the same narrative, focusing on the role of media-specific resources (e.g. camera movement enables shifts in focalisation, while musical motifs help convey emotions associated with themes such as friendship). Unsworth (2013) proposes that such analyses can be "a very engaging, enjoyable and effective pedagogic strategy" (p. 18) to foster critical multimodal literacy "from the middle primary/elementary school to senior high school" (p. 39).

Other studies move beyond proposals to implement and evaluate systemic functional approaches to teaching critical multimodal literacy. For example, students aged 10–11 in two Australian studies were introduced to concepts for analysing images and multimodal narrative texts and then engaged in authoring transmedia stories such as online comic strips they had first drafted on paper (Mills, 2011) and machinima-style animations based on nursery rhymes (Thomas, 2012). Both studies emphasised students' creativity in working with the options available within digital authoring tools, and the need for children "to learn the sign-system in the digital interface (e.g. flip, move, delete)", in addition to the metalanguage introduced in the classroom (Mills, 2011, p. 64). Thomas (2012), however, noted that few students used the metalanguage to articulate their authorial decisions. Mills et al. (2020), on the other hand, argued that having concepts for analysing attitudinal meanings empowered the 9–10-year-old

elementary students in their study to communicate attitude multimodally in their digitally-authored comics.

Lim and colleagues developed, implemented and evaluated explicit instructional methods for teaching secondary school students in Singapore to critically analyse film (Lim and Tan, 2018) and advertisements (Lim, 2018) and to compose digital videos (Liang and Lim, 2020). A software for systemic functional multimodal discourse analysis has also been offered as a means of helping teachers and students learn a metalanguage and use it for annotating multimodal texts and discussing meaning-making strategies (Lim et al., 2015; O'Halloran et al., 2017). A survey Lim (2018) conducted revealed that students enjoyed the lessons and felt the teaching approach improved their capacity for critical viewing, even though assessment of their actual skills reflected that they experienced difficulties with identifying the visual strategies in multimodal texts. The participating teachers reported that they appreciated having an explicit framework for teaching critical viewing that leveraged their knowledge about language, although some felt they had to simplify the terminology for their students.

The research reviewed in this section subscribes to the view that the overt teaching of multimodal literacy is key to equity in education (New London Group, 1996). Explicit pedagogies recognise the diversity in students' prior knowledge and experiences and avoid the myth that at all young learners, as 'digital natives' (Prensky, 2001), are necessarily confident in using new technologies (Bennett et al., 2008). Specifically, they highlight the value of a metalanguage for explicitly fostering and assessing critical multimodal literacy. These studies also suggest, however, that it is still the case that "the metalanguages and the extent of knowledge about language and image that is facilitative of multimodal literacy development at various stages of schooling remain very unclear" (Unsworth, 2013, p. 40). In fact, some of their findings imply that the selection of multimodality concepts and frameworks and their adaptation for the classroom should start from insights into young learners' existing knowledge about multimodal meaning-making and digital technologies, such as those revealed through the case study presented in this article. Additionally, while frameworks for critical multimodal studies of digital semiotic technologies now exist (Djonov and Van Leeuwen, 2018a, 2018b), their adaptability for literacy education is yet to be explored.

4. Transmedia storytelling as a ground for critical multimodal literacy

Transmedia narratives are not a new phenomenon. Lewis Carroll's *Alice's Adventures in Wonderland,* published first as a book in 1865, for example, has been adapted numerous times into formats as diverse as silent film (Hepworth and Stow, 1903), comic strip (Kuekes and Scott, 1934–1935), traditional animation (Geronimi et al., 1951), and more recently an interactive picture book app (Oceanhouse Media Inc., 2010–2016). The exploration of storytelling across different media has stimulated debates about "intermediality", "transmediality" and "media convergence" for decades (Elleström, 2019; Hassler-Forest and Nicklas, 2015; Jenkins, 2008). The value of narrative adaptations for literacy and arts education is well established, too.

Recently, however, researchers have argued that comparative analyses of adaptations of the same story in different media can advance multimodal theory and promote critical multimodal literacy. Tseng and Bateman (Tseng, 2017a; Tseng and Bateman, 2018) show that such comparisons reveal not only the affordances of media (books, 3D space, movement) and the meaning-making potential of modes (still and moving images, layout, music), but also the ways different media are co-opted for the construction of social themes and values in multimodal texts. Such comparisons can also demonstrate how lower-level material features of media (e.g. sound, lighting, camera movement, colour, touch-based interactivity), middle-level discourse elements (e.g. characters, objects, settings, actions) and structures (e.g. cohesive chains and narrative events) construct higher-level themes in narratives.

Drawing on Tseng and Bateman (Tseng, 2017a,b; Tseng and Bateman, 2018), Djonov and Tseng (2021) introduced a method for transmedia comparisons that takes as a starting point young children's multimodal awareness and can be adapted to help young children consider how exactly social themes are constructed in versions of the same literary narrative across different media. In this way, Djonov and Tseng (2021) extended Unsworth's (2013, 2014a, 2014b) proposal for using transmedia narratives to promote critical multimodal literacy to early childhood. The current study builds on this work as it considers not only children's engagement with but also their authoring of transmedia narratives and ability to create narrative scenes, and potentially raise complex social themes, through the use of different modes in digital and non-digital media.

5. Children's engagement with and authoring of a transmedia narrative: A case study

Through the *Morris Lessmore* case study presented in this section, this article contributes to both critical multimodal discourse studies and literacy research. Specifically, we explore the insights that children's experiences with transmedia storytelling offer into their funds of knowledge about different modes and digital as well as traditional media. We also make suggestions about how such insights could inform (i) the selection of suitable tools for critical multimodal analysis that could be adapted for use in the classroom and (ii) pedagogies that invite young learners to adopt a critical approach towards software for designing multimedia texts.

Like studies of children's digital literacy practices that adopt an interactional approach to multimodality, our case study draws on ethnographic data. These include observations of mothers and their preschool-aged children interacting with the same narrative presented in two media formats (traditional picture book and interactive book app), and an interview with Ollen about his experience of using different software tools to design the stop-motion animation. The observations originate from an earlier project, about talk during shared reading, yet have played a significant role in shaping the goal of this study – to explore the funds of knowledge about multimodality evident in children's engagement with transmedia narratives and consider their potential to inform the development of explicit critical multimodal literacy pedagogies.

As a whole, the research presented in this article is grounded in social semiotics. The *Morris Lessmore* case study examines the use of specific semiotic resources and the affordances of digital and non-digital media and how it may reveal the interests of meaning-makers. The study employs systemic functional multimodal discourse analysis to systematically compare the same narrative scene across different media – in the short film, interactive book app, and traditional picture book versions of *The Fantastic Flying Books of Mr Morris Lessmore* as well as in a comic strip and a stop-motion animation, created respectively by a 7-year-old and a 10-year-old child. Drawing on Djonov and Van Leeuwen's (2018a, 2018b) social semiotic model for critical multimodal studies of semiotic software, we then explore the semiotic resources and digital tools used in the making of the animation.

5.1. The focal transmedia narrative

The Fantastic Flying Books of Mr Morris Lessmore took a decade to make before it was released as an animated, silent short film (Joyce

and Oldenburg, 2011) and then re-versioned as an interactive app (Moonbot Studios, 2011) and finally a picture book (Joyce, 2012). It is a sophisticated literary narrative about the power of books to transform lives. It starts with the eponymous character portrayed reading on a balcony, with piles of books around him, when a hurricane suddenly destroys his town. Having lost everything, Morris begins to wander and meets a lady being "pulled along by a festive squadron of flying books" (Joyce, 2012, n.p.). Noticing that Morris is disappointed that his own book cannot fly, the lady sends him a book that can. The book leads Morris to a building where many books 'nest', and he begins living among and taking care of the books, which can fly as well as talk, sharing them with others, and writing the book of his own life. When Morris grows old, the books start taking care of him. When he finishes writing his own book, he bids them farewell, turns into the young man he once was, and is carried away by a flock of flying books. The story "ends as it began . . . with the opening of a book" (n.p.) – a little girl enters the library and starts reading Morris's book.

The book and app incorporate images from the silent film and a written story. The app also includes music and sound effects as well as a voice-over narration of the story, which can be switched on or off. The app comprises 27 scenes with interactive touch-spots that allow users to move objects, produce or transform sounds, and write on the pages of Morris Lessmore's book; play with an alphabet cereal; and fix the torn pages of books. Like the Academy-Award-winning short film, the app has been highly acclaimed as a "poignant, potent ode to books" (Kirkus Reviews, 2011, p. n.p.) and "example of an e-book [that] creates a seamless celebration of quality literature and engaging interaction between reader and text" (Carney and Mecoli, 2013, p. 66).

5.2. Preschool-aged children's interaction with the Morris Lessmore book and app

An earlier study one of us conducted asked 16 dyads comprising a mother and her 4–5-year-old child, in the year prior to starting school, to read the *Morris Lessmore* book and app. That study's aim was to compare the talk that mothers and children produced during shared reading of the book and the app. To allow the mothers to read the story in both formats, the narrator's voice-over was switched off in the app but the participants could still experience all other medium-specific features – sound, animation and interactive elements. Each dyad read both formats in the same session; eight pairs started with the app and eight with the book.

Despite focusing on talk and shared reading, the study provided insights into young children's multimodal awareness. During the experience, children spontaneously compared the book and the app, as we can see in the two interactions represented below.

Interaction 1.

A mother and her child had first read the app and spent considerable time exploring an interactive scene showing Morris looking like a doctor and fixing damaged books. The scene has two hot spots – a book that expands half-open, pumps air and sounds like as a ventilator when touched, and another that leads to a game where one can repair torn pages from books. The conversation below unfolded when the pair came across the same scene in the book:

Child: Mummy, I wonder what would happened if I pressed something.
Mother: Try.
Child: [presses the page] Nothing.
Mother: Ooh! [laughs, continues reading]
Child: [keeps pressing the book, and looking at the mother]
Mother: So here we've got to imagine
Child: [pressing the image of the 'ventilator' book] It did do
Mother: Did too
Child: Pass [slides finger across the page, in the direction in which air from the ventilator moves in the app]
Mother: [laughs]

Interaction 2.

Reading the app first, a mother and her child came to a scene that shows Morris standing at a window and facing a queue of four people in grayscale colour – a middle-aged man who takes a book from Morris, starts reading it and changes to full colour as he walks out of the scene, and a boy, a young man, and a woman who remain in the queue. Above their heads are four famous books – *Alice in Wonderland*, *Frankenstein*, *Treasure Island*, and *A Christmas Carol*. In this scene, the user can drag each book to one of the people in the queue. This makes that person transform into a character from the book and assume full colour, turn towards the viewer and utter sounds or words associated with that character – for example *Alice in Wonderland* transforms the boy into the White Rabbit, the young man into the Mad Hatter, and the woman into the Red Queen, who says "Off with her head!". The character then returns to their original identity and position as a grayscale figure in the queue.

Child: Why does he . . . pulls a book that he has out?
Mother: Let's have a look and see. Maybe you can give it to someone. Oh! That was *Alice in Wonderland*. Who are we going to give to that person? *Frankenstein*? What about this lady?
[Exploration of interactive scene continues.]
Mother: What about giving the boy the Christmas book? [laughs at the transformation]
[Child then drags *Treasure Island* to the boy, who acquires a cutlass, readies it for action and turning towards the viewer says 'Huhha!' with a smile, as shown in Fig. 1c here.]
Mother: I think he's happy with that one, isn't he?

At the end of the session, the child said that he liked the app better than the book "because you can give books to people".

Whereas in Interaction 1, the pair focused on the material affordances of the two media formats (the lack of touch-based interactive elements in the book), Interaction 2 exemplifies a young child's ability to compare semantic patterns (including characters, the user and their actions) in the two versions of the narrative.

5.3. Comparing characters and their (inter)actions in a scene from Morris Lessmore across the film, book and app

This section presents and illustrates a method for comparing segments from versions of the same narrative in different media. Young children's awareness of different media and semantic patterns evident in the interactions presented above suggest that this method could be adapted to suit critical multimodal literacy pedagogies for the early years of school. Specifically, a simplified version of it could be employed to engage children in comparing and discussing the ways characters and their (inter)actions are construed multimodally across different media.

The method employed here is inspired by SFL principles for analysing transitivity – how experiences are represented as semantic configurations of processes, participants, and circumstances (Halliday and Matthiessen, 2004). As transitivity is concerned with discourse-semantic patterns, and not merely their linguistic, or lexico-grammatical, realisations, Kress and Van Leeuwen (2006 [1996]) have successfully adapted these principles to images. Tseng and colleagues (Tseng, 2013a, 2017b; Tseng et al., 2018) have further extended them to films and comics for the purpose of examining how narratively significant elements such as characters, objects and settings are cross-modally realised and cohesively connected across speech and writing, still or moving images, and sound. In this section, we present this method and use it to

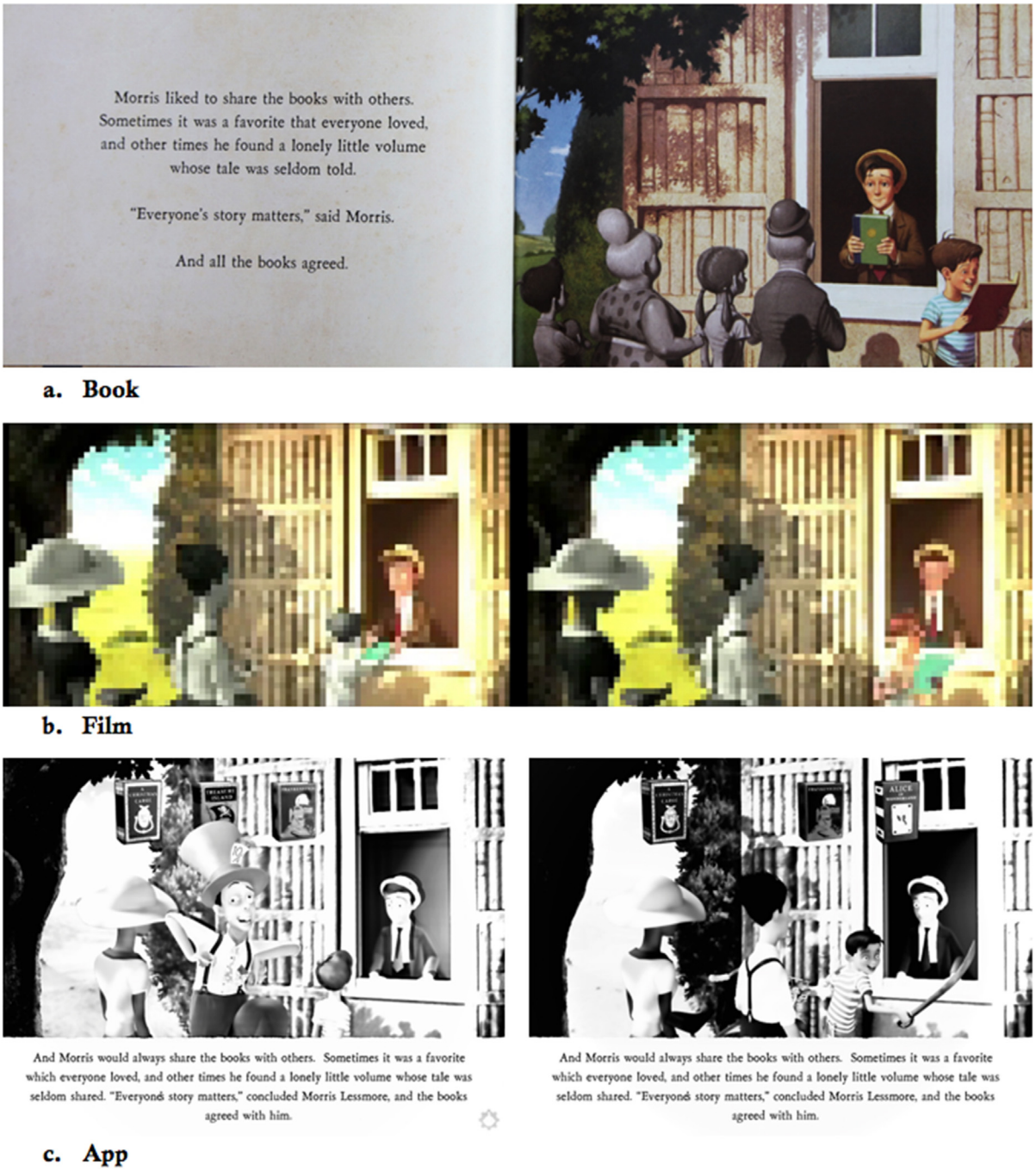


Fig. 1. "Morris sharing books" in the book (Joyce, 2012), and adapted from the film (Joyce and Oldenburg, 2011) and app (Moonbot Studios, 2011).

compare the representation of the scene "Morris sharing books" in the book, film and app, shown in Fig. 1.

Kress and Van Leeuwen (2006[1996]) distinguish between 'narrative representations', which are dynamic and construe "unfolding actions and events, processes of change", from those they call 'conceptual', which are static and depict "participants in terms of their more generalized and more or less stable and timeless essence" (p. 77). Importantly for us here, narrative representations are the kinds of actions that even 4–5-year-old children may notice in transmedia narratives (e.g. someone giving books to people). Kress and Van Leeuwen (2006[1996]) further recognise four main types of narrative processes, and characters and objects that define each type. These are summarised in Table 1.

Table 1
Narrative processes, characters and objects in multimodal narratives.

Narrative process types	*Roles of characters/objects*
Actions	Actor, Goal
Reactions (e.g. gazing, observing)	Reacter, Phenomenon
Mental process (e.g. thinking, feeling)	Senser, Phenomenon
Verbal (e.g. saying, singing)	Sayer, Addressee

In still and moving images, narrative processes are realised by a visually perceptible "volume" such as a person or object and a "vector", a line formed or implied by some part/s of what is represented. For example, the boy's arms in Fig. 1a construe an Action

process, where he is the Actor and his hands are the vector connecting him to the book, which functions as Goal. A Reaction process is realised by an eyeline vector, connecting the gaze of a human or quasi-human Reacter to a Phenomenon (a person, a thing, a setting or another process). For example, the boy in Fig. 1a is Reactor looking at the book he is holding, which is the Phenomenon. Two further types of narrative process are those that project the characters' thoughts (mental processes) or sayings and utterances (verbal processes). These two processes are conventionally construed through thought bubbles and speech balloons in images or comics. Both are represented only verbally in Fig. 1a: "Morris *liked* to share…" and "a favourite that everyone *loved*…" (mental) and "Everyone's story matters," *said* Morris (verbal).

In a multimodal narrative, significant elements tend to be foregrounded through their realisation across more than one mode. The three main participants in the "Morris sharing books" scene in the book are Morris, other people and books/stories. This is because they reappear across both pages representing that scene, and are multimodally realised (as shown in Table 2) and connected through cohesive mechanisms (e.g. the anaphoric reference between "he" and "Morris" and the lexical cohesion between the synonyms "tale" and "story").

The link between these elements is the (inter)action of sharing/-giving. This action is most foregrounded in that scene in the book as it is realised both verbally ("sharing") and visually (as the right-hand page depicts Morris giving books to other people). Following Tseng (2013), the transitivity structure of this scene in the book can be represented through the pattern in Fig. 2a. This pattern shows only those actions that are 'narratively significant' – the actions of sharing, giving and reaching link the main participants, namely, Morris, books and other people, and are more foregrounded through their cross-modal realisation compared to other types of actions such as 'looking' or 'standing' which are only visually represented or 'said' and 'agreed', which appear only in the verbal text.

In the silent film, this scene has the same structure as in the book: Morris is shown giving books to other people who are standing in front of him (see Fig. 1b and the section from 10'51" to 11'07" in the film on the Moonbot Studios Vimeo channel here: https://vimeo.com/groups/222527/videos/35404908). The moving images, however, are able to dynamically show the transformation of the boy from a grayscale to a coloured figure. This is reflected in the transitivity structure in Fig. 2b. Comparing the book and film thus reveals a difference in media affordances, namely, in addition to the processes of giving and reaching, the action of the boy *changing* is foregrounded in the film, while the still image in the book does not explicitly show his transformation.

The interactive app represents the same event even more dynamically: the user can drag each of four books to each of the people in the queue, and thus interactively share in Morris's action (see Fig. 1c). Compared with the structures in Fig. 2a and 2b, Fig. 2c includes the *user* as an additional Actor and the label 'new identities' to capture the ways people are transformed when the user 'gives' them books. This structure reflects the affordances of the app as an interactive digital technology for creating a more embodied experience, enabling users to identify with Morris by performing the same action.

Table 2
Multimodal realisation of narratively significant elements in "Morris sharing books".

Participants	Multimodal realisation	
	Verbal	*Visual*
Morris	"Morris", "he"	Morris in the house/library
Other people	"others", "everyone"	four people facing Morris
Books and stories	"books", "it", "volume", "tale", "story"	the books held by Morris and the boy

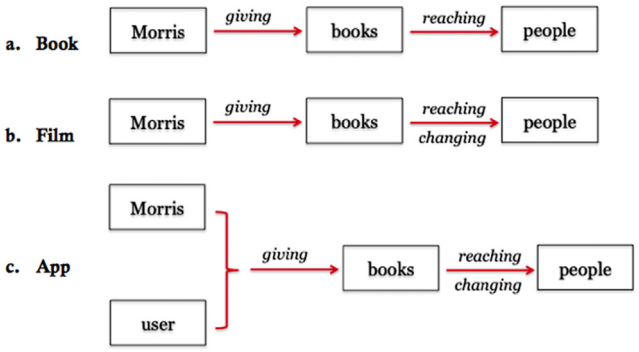


Fig. 2. Transitivity pattern of "Morris sharing books" in the book, film and app.

In summary, the transitivity analyses in this section show that each of the book, film and app versions of the same scene in *Morris Lessmore* mobilises different affordances to construct the same event, and thereby strengthen or constrain the capacity of the narrative to create engagement with the story's key theme – the transformative power of sharing and reading books. We therefore suggest that this method of analysis can be simplified and used for the purpose of extending young children's capacity to reflect on differences between media and on semantic patterns in narrative texts. For example, young learners could be invited to examine whether characters and their (inter)actions, thoughts and feelings are represented through words, images or both. Teachers could also support children to draw and compare transitivity patterns (like those in Fig. 2) realised across versions of the same narrative in different media and evaluate the effectiveness of such patterns for construing and stimulating the audience to consider social themes (e.g. about the transformative power of sharing and reading books).

5.4. Children's re-creations of a transmedia narrative scene

In this section, we compare the transitivity patterns in Oskar's comic and Ollen's stop-motion animation, which depict the scene of Morris sharing books with others. This analysis reveals similarities and differences in the two children's knowledge about multimodality and narrative.

We asked Ollen (age 10) and Oskar (age 7) to read the book, watch the film and interact with the app *Morris Lessmore*, and to then select a scene they would like to re-create in their medium of choice. Ollen chose to re-create "Morris sharing books" as a stop-motion LEGO animation, and we asked Oskar to re-create the same scene, which he chose to draw as a comic strip. Living on different continents, the children completed their creations independently, without seeing or discussing each other's work. Selected screenshots from Ollen's film are shown in Fig. 3 (and the full 53-second animation can be viewed in the Appendix to this article or on YouTube: https://www.youtube.com/watch?v=KLrBxJOOUjA) and Oskar's comic strip in Fig. 4.

Ollen's animation construed the event "books give people new identities" dynamically. In Fig. 4, Morris is first shown in the house/library giving a book to an astronaut. After the astronaut reads the book, he transforms into a pirate. The book then flies up and the pirate turns towards the camera with his sword before walking out through the black door in the back left corner. Such identity transformations are depicted for each of three LEGO figures. The foregrounded transitivity structure is shown in Fig. 5a. While the basic structure of the stop-motion animation is the same

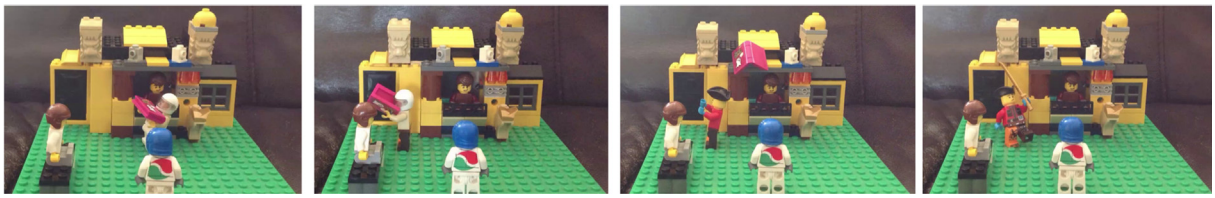


Fig. 3. Selected screenshots from Ollen's stop-motion animation.

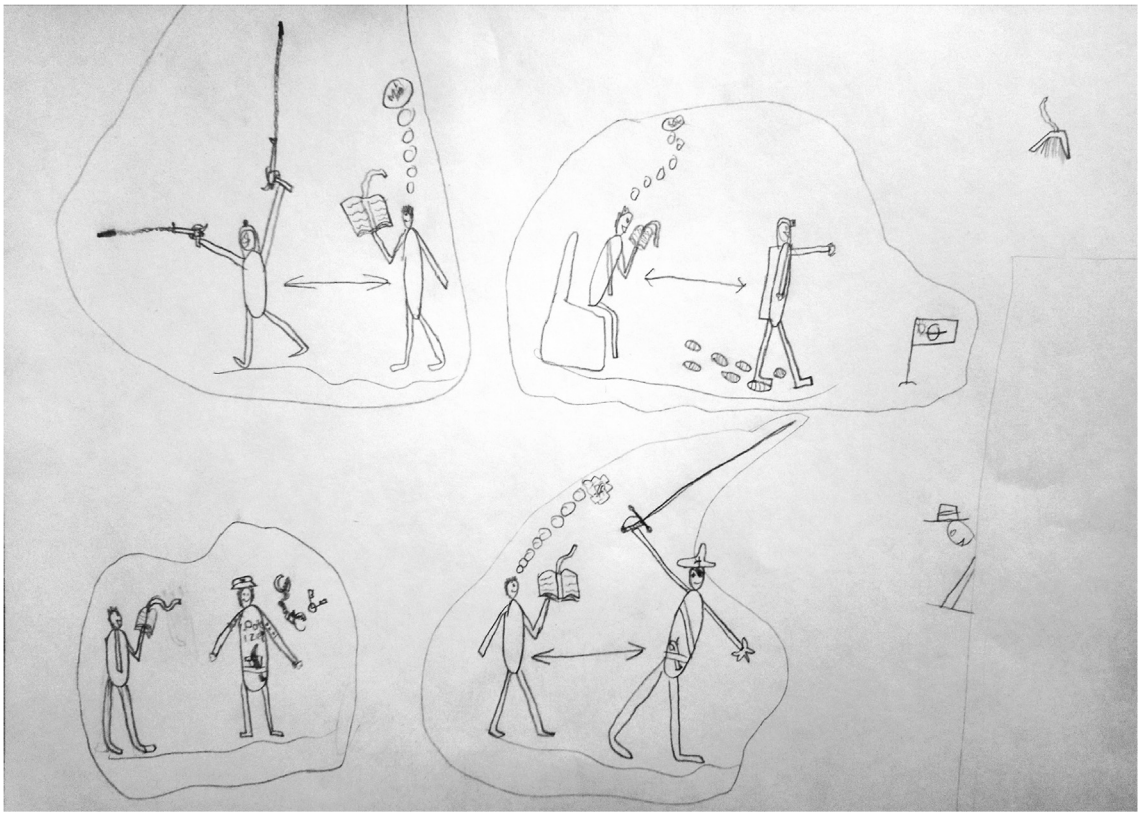


Fig. 4. Oskar's comic strip.

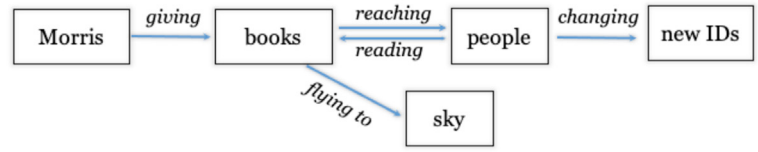
as in the original film version ("Morris - giving - books - reaching - people" in Fig. 2a), it also incorporates a very significant process from the app version (Fig. 2c), namely, "people - changing - identity".

A new prominent action introduced into the animation is "people reading books" (see second frame in Fig. 3). In the original film and app versions, the people are transformed immediately after the books reach them. But coincidentally, in their renditions of the scene, both children highlighted the causal relation between the processes of opening/reading books and changing identity, albeit using different media affordances and meaning-making conventions.

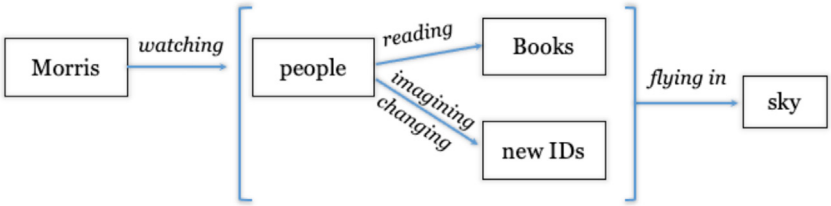
Another interesting theme in both the LEGO animation and the comic strip is "flying books". In the animation, each of the three transformation processes starts with a book being given by Morris to a person, read by the person and then flying up from the person's hands after the identity change (the third frame in Fig. 3). In the original book, film and app versions, the theme of flying books is not included in this scene, although it is a central motif in the narrative related to its overarching theme of the power of books. Yet, just like Ollen integrated the "flying book" motif in his animation, so too Oskar included "a flying book" in the upper right corner of his comic creation. Ollen's and Oskar's inclusion of "reading book" and "flying book" actions – which are respectively not foregrounded or not represented in the scene "Morris sharing books" in the original book, app and film versions – exemplifies the children's capacity to notice prominent themes in a narrative and incorporate these themes into their own versions of the same narrative.

In Oskar's comic strip, the identity transformation is depicted in four panels. Comic conventions such as thought bubbles and arrows depict each of four characters as reading and imagining the transformation to their new identities of robber, astronaut, policeman and pirate. The spatial constraints of the page have led Oskar to leave out the process of "Morris giving books to other people", which is present in all other versions of this scene analysed here. In Oskar's comic, Morris (at the right side of the page) is depicted observing the other characters' actions of reading books and imagining new identities instead. Here Morris is a Reacter *watching* four other people each engaged in *imagining,* as a Sensor in a mental process construed through a thought bubble. This is reflected in the transitivity pattern in Fig. 5b.

The different spatial–temporal constructions of Ollen's and Oskar's artefacts reflect the affordances of their chosen media. The comic strip by Oskar is presented in a non-linear manner. The four panels construct co-hyponyms of the narrative theme of



a. LEGO stop-motion animation



b. Comic strip

Fig. 5. Transitivity structures in Ollen's stop-motion and Oskar's comic strip.

'books transforming people'. In the stop-motion, Ollen has used the three-dimensional LEGO construction and the linearity of the film medium to locate the setting and event progression analogously to the way this is achieved in the original film.

Despite these differences between the two media, both children have used cohesive mechanisms to distinguish generic and specific characters (Tseng, 2013b, p. 41). In Ollen's film, the main character Morris is the only person continuously seen facing the camera, while the other three people are seen mostly from the side or back (which signifies them as generic characters) and only briefly frontally when they change identities. In Oskar's comic, the generic characters are each presented in a separate panel, and each panel represents the same processes, using the same comics conventions.

In summary, the transitivity analysis of Ollen's and Oskar's texts reveals both children's understanding of narrative conventions and capacity to construe narrative themes by selecting the most apt semiotic resources available in their chosen media. Asking children to re-create a narrative scene in different media can thus be a useful strategy for uncovering their awareness of how narratives construct social themes through the use of various meaning-making resources. This could help educators select and adapt to their classrooms concepts and tools for teaching *all* children to identify broad social themes and values in narratives as well as systematically analyse and explicitly discuss how these are construed through particular discourse-semantic structures (e.g. characters, objects, settings, actions and the events and cohesive chains that connect them) and how these structures are materialised through lower-level media features (e.g. sound, lighting, camera movement, colour).

5.5. A child's use of software as a semiotic technology

This section presents insights from our case study with implications for developing pedagogies that could encourage young learners to adopt a critical multimodal perspective towards software. For this purpose, we employ a framework for studies of software as technology for making meaning, i.e. a semiotic technology (Djonov and Van Leeuwen, 2018a, 2018b) to examine Ollen's experience of using digital tools to design the stop-motion animation.

While critical perspectives on software are well established in media, cultural, composition and design studies, a focus on how software enables and constrains multimodal meaning-meaning is a more recent development (see review in Djonov and Van Leeuwen, 2018a). Extending Van Leeuwen's (2005) agenda for social semiotics, Van Leeuwen and Djonov (2013) proposed that critical multimodal studies of software should examine:

(1) software's design – what semiotic resources a software tool makes available and how its interface and help menu privilege some of these resources over others
(2) software's use in specific institutional and socio-historical contexts, and discourses about it; and
(3) the broader semiotic landscape and socio-cultural context in which software design and use interact.

This idea is captured in Fig. 6. In this model, a software tool is defined as a 'semiotic artefact', a material semiotic resource that incorporates selections from various modes (e.g. layout, colour) and media (e.g. visual, aural) and norms about the practices and ways in which these should be used (Djonov and Van Leeuwen, 2012). The bold brace from 'software design' to 'software use' signifies that the semiotic potential of software products reflects the interests of the companies behind them, rather than how people use these products. The dashed arrow from 'software use' to 'software design' acknowledges that a product's use *may* inform its redesign, albeit only at the discretion of software developers.

The framework supports critical multimodal studies of software to take two perspectives:

(a) starting, bottom-up, from a software tool or a particular semiotic resource within it (e.g. layout, animation) and examining how the tool recontextualises certain *semiotic* practices, i.e. social practices that can be realised only through the use of semiotic resources (e.g. designing a stop-motion animation);
(b) starting, top-down, from a broader *social* practice (e.g. sharing videos on YouTube) that encompasses but extends beyond specific semiotic practices, and examining how software tools such as social media platforms enable, regulate and transform such practices.

To recreate the scene of "Morris sharing books", Ollen used LEGO and two software tools – Stop Motion Studio (Cateater, LLC., 2018) on an iPad and Garage Band '08 (Apple 2007–2012) on an iMac. After that, we interviewed him about this design process. Drawing on this interview and our analyses of the animation

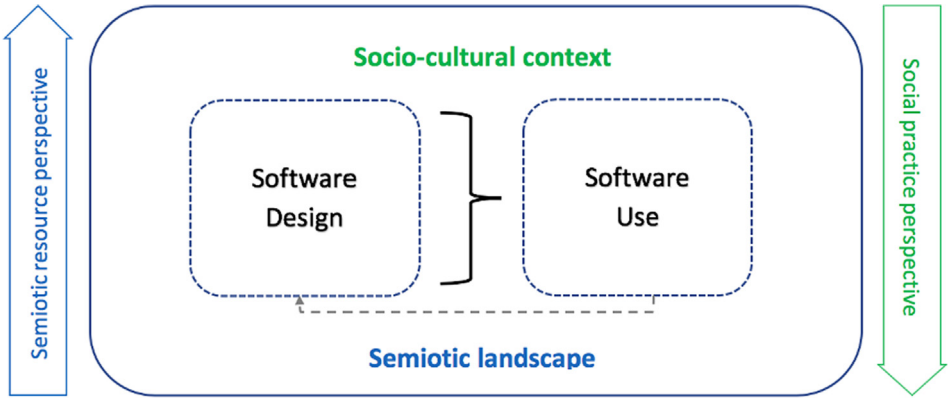


Fig. 6. Framework for critical multimodal studies of software as semiotic technology (adapted from Djonov & Van Leeuwen, 2018b).

and the software tools employed in making it, here we discuss three key findings of our case study that have implications for encouraging young learners to adopt a critical multimodal approach to semiotic software.

First, Ollen's transmedia authoring decisions were informed by his familiarity with both different software tools and the affordances of non-digital media. For example, he explained that he decided to use LEGO because he "could easily make a little library set up with Morris Lessmore and the other characters", that he signified the building as a library and a happy place by using respectively two lion head statues and yellow bricks "because yellow means happiness", and that LEGO made transforming the characters easy as he just had to change their parts (e.g. from frowning to smiling face) and accessories (e.g. a coffee mug, a cap) (see Fig. 7). Ollen also mentioned other video and animation software (e.g. Film Maker and Adobe Premiere) but emphasised that Stop Motion Studio was easy to use. This echoed the way this product is marketed – as "the world's easiest app to get you into stop motion moviemaking today!" on Apple's App store, and as a tool for designing "those groovy Lego shorts on YouTube" on cateater.com.

Secondly, Ollen demonstrated awareness of some semiotic resources the two software applications offered and associated traditional as well as digital semiotic practices. He liked that Stop Motion Studio offered the possibility of recording a voice-over and importing, overlaying and synching different soundtracks with each other and with the visual track. This reflects an awareness of what Burn (2016) describes as a defining feature of animation design – the bifurcated production of the visual and aural tracks and their unification in the editing process – something much more easily achieved with than without digital technologies. Ollen recorded himself saying "The fantastic flying books of Mr. Morris Lessmore: Books transforming people" in Stop Motion Studio and then synched this recording with an intertitle – the words "Morris Lessmore flying books scene", hand-written on a piece of paper – being raised to reveal the set behind it (not unlike a theatre curtain).

Fig. 7. Library setting constructed with LEGO in Ollen's stop-motion animation.

Ollen used Stop Motion Studio which, being the free counterpart of Stop Motion Studio Pro, offered no sound samples. This led him to create the music track for the animation using the Magic mode in GarageBand'08. There he could find several samples in different styles ('Blues', 'Rock', 'Country', 'Latin', etc.) from which he selected 'Jazz' and then modified it. From his perspective, Magic GarageBand offered two key advantages. The first was that each sample featured more instruments than Ollen could play or access. The second was the opportunity to "pre-listen" to each sample, select a music style, and then modify it (e.g. replace a trumpet with a guitar solo; adjust the sound quality of each instrument). This example features two distinctly digital semiotic processes. One is what Burn (2016) terms 'compositional redrafting' – "reworking [a pre-given] syntagm through paradigmatic substitution" (p. 323). The other is the software guiding the user's decisions and learning about multimodal composition (Gilje, 2011).

Finally, the design of the software shaped the animation Ollen created. Not having certain resources, such as sound samples, design themes, options for creating title and credits screens, visual filters, special effects or frame/image editing options, available to him in Stop Motion Studio led Ollen to design the title page on paper as well as to rely on a transparent piece of LEGO to attach the flying book to various points of the building so he could incorporate the 'flying books' motif from the original narrative. This was a creative solution to being unable to photo-edit frames or use digital compositing in Stop Motion Studio.

Other features were available in Stop Motion Studio but not foregrounded through its interface design. For example, the grid is not activated by default, nor is setting up a grid required (as it is when starting projects in professional graphic design products). No prompts inform users that Stop Motion Studio offers an 'onion skin' tool (which can be used to overlay and align frames). Knowing about these resources may have stimulated Ollen to experiment with the position of the iPad camera (and thus with focalisation). Ollen's decision to shoot the animation from a single, static point of view, and turn the characters towards the camera (as

actors in theatre would do) so the audience can see their transformations, however, could simply reflect lack of awareness that is it possible to use images taken from different angles to build an animation.

The findings presented in this section suggest that young learners may or may not be aware of the semiotic resources a software tool offers and the practices it could support. Guiding them to examine the design of a software product – the semiotic resources it makes available and how they are presented in its help menu and related training materials (e.g. on YouTube) – is thus an important step in equipping them to employ the tool effectively. Approaching semiotic software critically, however, also involves considering what semiotic resources a given product could have included or made easier to use but does not; how its design recontextualises and regulates particular semiotic and social practices; and whose values and interests it serves. To prompt young learners to explore these questions, that is, to examine software in relation to the broader semiotic and socio-cultural landscape, educators could invite them to compare software products designed for similar semiotic or social practices but possibly different types of users (e.g. Stop Motion Studio and Adobe After Effects; YouTube and YouTubeKids). They could also engage them in authoring transmedia narratives in both traditional and digital media (cf. Mills, 2011; Thomas, 2012). In fact, starting from the desire to tell a story that conveys particular social themes may stimulate children not only to become aware of the limitations of digital technologies but also to creatively overcome them.

6. Concluding remarks

The case study of children's experiences with transmedia narrative presented in this article revealed children's funds of knowledge about multimodality and digital semiotic technologies. Our observations of preschool-aged children and their mothers interacting with the *Morris Lessmore* book and interactive app highlighted these children's ability to compare both media affordances and multimodal semantic patterns such as those connecting characters and their (inter)actions in these two formats. The analysis of how such patterns were multimodally realised in a scene from the same narrative re-created as a comic strip by 7-year-old Oskar and a LEGO animation by 10-year-old Ollen reflected these school-aged children's understanding of narrative conventions and capacity to construe broad social themes by selecting the most apt semiotic resources available in their chosen media. Alongside our analysis of Ollen's animation, we also considered the software tools employed in making it and interviewed him about that process. Our findings show that not only Ollen's familiarity with different types of digital semiotic technologies and non-digital resources (e.g. LEGO) but the software's design, too, guided his transmedia authoring decisions.

This article advanced the argument that observations of children's experiences with transmedia narratives provide a suitable starting point for developing effective approaches to critical multimodal literacy education in the digital age. We posited that such observations can help educators consider which concepts and frameworks for the critical multimodal analysis of texts and digital technologies to adapt for use with young learners in the classroom. Specifically, we suggested that comparing transitivity patterns in the same narrative across different media may extend children's capacity to notice characters and their (inter)actions. Such comparisons can also help children examine the ways semantic patterns are resemiotised across different media, through the use of linguistic and other modes, and their potential to construct and invite engagement with broader social themes. This approach moves beyond tokenistic inclusion of digital texts in the classroom, as it encourages teachers and students alike to adopt a critical multimodal perspective in considering similarities and differences in whether and how the same narratively significant elements are construed cross-modally in digital and non-digital versions of the same story.

Our case study also highlighted the potential of children's authoring of transmedia narratives to both reveal and sharpen their awareness of how higher-level narrative themes and genre conventions shape semiotic choices at lower levels of discourse organisation. For example, as the main character in a fictional narrative, Morris Lessmore was construed as a specific participant and made salient by being depicted from a frontal angle throughout Ollen's animation, and shown as observing, and thereby framing, the transformations of the four characters presented in separate, non-linearly organised panels in Oskar's comic.

We also proposed strategies for encouraging all young learners to adopt a critical approach to software as a semiotic resource. These may involve starting, bottom-up, by considering the semiotic resources available within certain software tools and how they relate to resources available in the broader semiotic landscape, or top-down, by examining and comparing how these software tools digitally recontextualise various social practices. Our case study, however, suggests that pursuing the goal of constructing a narrative that conveys particular social themes may provide today's children – whose familiarity of non-digital semiotic resources and social practices may be limited – with a particularly valuable opportunity to both notice and learn to work against the limitations of semiotic software. In so doing, our case study has brought discursive concerns to the fore of efforts to develop critical multimodal approaches to digital semiotic technologies.

In closing, we note that not all 'digital natives' would have been privileged enough to develop the knowledge about different modes, media, narrative conventions and semiotic software that the children in our case study demonstrated. The explicit introduction of concepts and frameworks for the critical multimodal analysis of texts and digital technologies thus remains key to equity in promoting critical multimodal literacy in *all* young learners.

Declaration of Competing Interest

None.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dcm.2021.100493.

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