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m-Reading: Fiction reading from mobile phones

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Abstract
Mobile phones are reportedly the most rapidly expanding e-reading device worldwide. However, the embodied, cognitive and affective implications of smartphone-supported fiction reading for leisure (m-reading) have yet to be investigated empirically. Revisiting the theoretical work of digitization scholar Anne Mangen, we argue that the digital reading experience is not only contingent on patterns of embodied reader–device interaction (Mangen, 2008 and later) but also embedded in the immediate environment and broader situational context. We call this the situation constraint. Its application to Mangen's general framework enables us to identify four novel research areas, wherein m-reading should be investigated with regard to its unique affordances. The areas are reader–device affectivity, situated embodiment, attention training and long-term immersion.

Keywords
Adults, affect, attention, digitization, embodiment, fiction, immersion, mobile technology, phenomenology, reading, smartphones, user experience

Introduction: The situation constraint

In 2008, the *Journal of Research in Reading* published a theoretical essay by Anne Mangen (2008) entitled 'Hypertext Fiction Reading: Haptics and Immersion'. In the essay, which is gaining a considerable citation record, Mangen provides a phenomenologically informed analysis of the

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differences between hypertext fiction reading and the reading of fiction in traditional print book format (see also Mangen and van der Weel, 2017). Mangen suggests that hypertext fiction, due to its sensory–motor affordances, is detrimental to what she calls phenomenological immersion, that is, to deep engagement with a narrative and the fictional world it is meant to conjure. Hypertext fiction has long since waned in popularity, owing in part to the problem of nonlinear narrative, but importantly, Mangen generalizes this hypothesis to all types of fiction reading for leisure from digital devices, a perspective that she has since pursued in her empirical studies (Mangen and Kuiken, 2014; Mangen et al., 2013) as well as theoretical writing (Mangen, 2016; Mangen and Schilhab, 2012).

We embrace Mangen's concern with the future of fiction reading as an activity that has been shown to yield unique cognitive and affective benefits (Kidd and Castano, 2013; Mol and Bus, 2011). In the present essay, however, we wish to critically revisit some of Mangen's more general suggestions concerning digital reading. We will do so while specifically considering the current increase in reading from mobile phones, or what we will call m-reading. Our aim here is similar to Mangen's (2008). We will challenge theoretical assumptions – those of Mangen herself – by bringing together extant research in communication studies, media psychology, philosophy and the cognitive and neurosciences. In line with Mangen (2008), we will rely on empirical data collected by others and consider hypothetical situations modelled on these data, but we also wish to propose new areas and research avenues for the future empirical investigation of m-reading as a source of potentially novel reading experiences.

We acknowledge that digital reading has been theorized in depth by other researchers, sometimes preceding Mangen's essay by a decade (e.g. Kaplan, 1995; Schilit et al., 1999). Some of this work (Marshall and Ruotolo, 2002; Schilit et al., 1999) concurs closely with the points we wish to raise below. What makes Mangen's position worthy of particular scrutiny, however, is her degree of interest in reading for distinctly aesthetic purposes, that is, in dimensions of bodily and affective experience that are not easily captured through analyses of e-reading for information retrieval as carried out by others (e.g. Marshall and Ruotolo, 2002; Rose, 2011).

Writing in 2008, Mangen asks: 'Will we be reading novels on screen – perhaps on our mobile phones – in the future'? A decade later, the answer to this question is affirmative. Although m-reading is so recent that systematic research has yet to be initiated, consumer reports produced by industry and governmental organizations are already beginning to chart its existence as a cultural phenomenon. For instance, the Pew Research Center released a representative statistics in 2012 (Rainie et al., 2012), indicating that 29% of American readers had read at least one e-book during the previous year. Twenty-nine per cent of those readers had read an e-book on their mobile phone. Independent reports suggest that mobile phones are to some degree being adopted for fiction reading across the entire world (e.g. Wischenbart, 2014) and that they facilitate leisure reading in reader groups that were previously excluded due to physical impairment (e.g. Picton, 2014). In developing countries, large-scale literacy campaigns have been successfully launched that exclusively rely on mobile devices (UNESCO, 2014).

While a minority of habitual e-book readers in the more affluent parts of the world have switched to m-reading exclusively, the reported trend (Maloney, 2015) is that more and more readers combine their reading devices, print books included, as suitable to their instantaneous needs and reading conditions. e-Reader sellers (Amazon, Kobo) provide syncing software that even enables one to read an e-book on several devices simultaneously, conveniently changing devices between sessions. Across any number of synced devices, the e-book always opens on the last page read. The typical m-reading demographics seems to be the heavily multitasking

urban professional and/or parent (Nielsen, 2015a, 2015b), for whom the mobile phone is invaluable in affording brief pockets of leisure in between more mundane tasks, for example, while shopping or on public transport. In preliminary exploratory studies, some m-readers report these opportunistic reading sessions to be no less immersive or engaging than more traditional ways of fiction reading (Burke and Bon, 2018; Hupfeld et al., 2013; Kuzmičová et al., 2017).

We agree with Mangen that reading experience and performance are deeply entrenched in the reader's body and therefore subject to sensory–motor contingencies such as the bodily posture, manual activity and so forth afforded by a particular reading device. In the light of the current emergence of m-reading, however, we would like to suggest an extension to the embodiment constraint introduced by Mangen. Following the theoretical framework of situated reading proposed by Kuzmičová (2016), we would like to stress that the reader's experiencing body is always embedded in an environmental (e.g. a private bedroom vs. an airport lounge) and broader situational context (e.g. bedtime relaxation vs. time killing in public). We call this the *situation constraint*. In Mangen's (2008 and later) account of digital reading, the situation constraint has been disregarded. By introducing the situation constraint, we will address and revisit the following two arguments as presented by Mangen (2008):

I. Digital reading devices call forth an alterity relation on the part of the reader.
II. Readers' capacity for immersion may decrease due to digitization.

Our main focus is m-reading at its most technologically basic, that is, the reading of the traditional continuous linear text, presented either in a self-contained file or online, rather than the digital-born format of hypertext fiction that initially prompted Mangen's queries about digital reading. We realize that by constraining our focus to digitized traditional text we are merely scratching the surface of what mobile phones do for the evolution of narrative reading, from the first SMS-based novels of the early 2000s (Ito et al., 2005) and their newer relatives available through the Hooked application (Ha, 2015), to various types of site-responsive mobile storytelling (Dovey, 2015; Farman, 2014) and speed-reading apps such as Kindle's Word Runner. A closer analysis of these latter forms of reading from mobile phones falls beyond the scope of this essay for reasons of relative comparability between the print and digital phenomena under discussion, so as to secure common ground, and the hypothetical possibility of systematic empirical validation, in our dialogue with Mangen's (2008 and later) comparisons. Although this essay's outlook on m-reading is relatively narrow, we are non-committal as to how broadly or narrowly the m-reading label may potentially be used by others.

Our typical m-reader is an adult member of one of the more privileged societies in the Northern/Western hemispheres, an individual who has a habit of reading fiction for leisure and who has some history of doing so in print. Such are also the readers hypothesized and empirically studied in Mangen's work on reading from digital devices (most notably Mangen and Kuiken, 2014), wherein hypertexts are currently no longer the main concern, whereas the above arguments I and II – and varieties thereof – continue to play a vital role. As Mangen currently advocates a new integrative cross-disciplinary framework for reading research, calling for conceptual models that would enable any aspect of reading to become subject to experimental hypothesis testing (Mangen and van der Weel, 2016), it is important that situated perspectives such as the one presented here are factored in within such a framework.

Reader–device relations

Mangen (2008) suggests that digital reading devices call forth an alterity relation on the part of the reader. A notion adopted from postphenomenologist and science philosopher Ihde (1990), *alterity relations* are such phenomenological relations that make a technology salient in the user's consciousness *qua* other, an opaque object in the world. A device standing in an alterity relation to oneself fails to achieve phenomenal transparency and rekindle one's consciousness towards the world it is meant to help access – in the case of fiction reading, the fictional world of a story and the experience of immersion more generally. On Ihde's account, alterity relations are one among three basic categories of human–technology relations. The remaining alternatives are *embodiment relations*, which make a technology more or less transparent in accessing the world perceptually (e.g. eyeglasses or telescopes), and *hermeneutic relations*, wherein the world is accessed by means of deliberate construal, an act of decoding (e.g. maps, thermometers, but also texts).

Mangen's (2008) view is that phenomenological immersion in reading is contingent on the primacy, in the reader's consciousness, of the hermeneutic relation. According to Mangen, such primacy is incompatible with the distractive intangibility of the digital text as well as the haptic salience of digital devices, both relative to print books. Although the main focus is on hypertext fiction reading specifically, the two attributes in question are proposed to concern digital reading more generally. Mangen argues:

> While reading a print book, the technological artefact – the book, the pages – partly withdraws, so that our intentionality is primarily directed towards the narrative fiction itself, and not to the technological object as such. Hence, the hermeneutic relation dominates the embodiment relation in our experiential (phenomenological and perceptual-cognitive) relation to the book. When reading a hypertext fiction (. . .) the combination of *the intangibility of the text* and *the prevalent haptic affordances of the computer* make our hermeneutic relation – and hence phenomenological immersion – highly vulnerable to being captured by the haptic affordances of the computer and, hence, making us relate to the computer in a primarily alterity rather than hermeneutic relation. (Mangen 2008: 415; emphasis added)

Mangen's position raises various questions. For example, Mangen rigorously reviews evidence of alterity experiences brought about by digital media but refrains from providing corresponding support for the idea that print books are phenomenally transparent to readers. In fact, the subjective reports of some readers suggest contrary experiences in some situations (Kuzmičová et al., 2017). By disregarding this even as a hypothetical possibility, parts of Mangen's argument approximate the folk notion, closely treated by theorist Matt Hayler (2015), that digital reading is simply 'unnatural'. However, our two main revisions to Mangen's (2008) argument, particularly but not exclusively relating to m-reading, follow a different route and are presented in the next two subsections.

Affectivity

Mangen's argument presupposes that, in immersed reading, alterity relations are value-negative. In this respect, she contrasts reading with gaming, the type of human–computer interaction predominantly cited by Ihde (1990, 1991). The desktop or other computer in gaming, Mangen argues, stands to a gamer's consciousness as rival or antagonist in combat. While such a relation may be experienced as 'positive and existential' (Mangen, 2008: 415) in gaming, it is assumed to weaken immersion in the case of reading. In her more recent work, Mangen (2016) has further come to

reiterate this idea by emphasizing the notion of haptic dissonance (Gerlach and Buxmann, 2011), that is, the experience reported by some readers that technological novelty stands in the way of the pleasures habitually expected from fiction reading.

What is disregarded in this argument is the possibility that a digital device, whether it is a desktop computer or a mobile phone, can have a generally positive affective value that plays into one's user experience regardless of the specific type of activity performed on the device, reading included. For example, research in the media and communication field shows that mobile phones in particular tend to be invested with strong affections whose overall value is positive (for a review, see Serrano-Puche, 2015). In several studies, users have reported stable and highly individuated positive feelings for their mobile phone in its capacity as a personalized, indispensable and irreplaceable companion (e.g. Dias, 2016; Vincent, 2013).

In convergence with the latter findings, philosophers Colombetti and Krueger (2015) map the roles played by the environment in general, and especially objects of material culture, in everyday affectivity. The physical environment, Colombetti and Krueger argue, is actively manipulated to sustain, amplify or dampen one's affective states. Portable objects are then particularly suited for such instantaneous self-regulation due to their higher availability in comparison to stationary ones. The affective self-regulation achieved through manipulating such an object, be it a musical instrument (the authors' key example) or a mobile phone, need not be premeditated or even conscious. Rather, it often occurs while one's attention is focused on some other main activity, for example, performing music or reading a stretch of text. This does not prevent the positive affective charge of the sheer physical manipulation from spilling over into the main activity.

Furthermore, Colombetti and Krueger (2015) single out, among several different variables relative to affective self-regulation, a phenomenon called performative entrenchment. In cases of performative entrenchment, users manipulate a relatively complex object skilfully, but not entirely non-consciously, insofar as they keep monitoring their performance, for example, through motor and kinesthetic feedback. The feedback in turn contributes to the users' mood regulation. Again, the authors' example is a musician playing an instrument. m-Reading practices and other ways of using the mobile phone exemplify performative entrenchment with added nuance. On the one hand, the newest phones are designed to afford optimal intuitive and ergonomic experience that cannot be compared to the efforts entailed in mastering a musical instrument. On the other hand, the dynamic mobile interface, with its complexity of possible uses and navigation routes, is designed to elicit a sense of fluency in the user not so unlike the sense of tackling a creative (e.g. musical) challenge, an experience readily contributing to various mobile phone-related compulsive behaviours (Kwon et al., 2013).

In m-reading, additional pleasures of the distinctly aesthetic kind then combine with performative entrenchment at the hermeneutic, meaning-making level of the story being read. Finally, it should also be noted that for some of the more typical m-readers, who may otherwise struggle to fit in leisure reading in their busy routine (Kobo, 2016, Maloney, 2015; Nielsen, 2015a, 2015b), further positive affects avail from the sheer awareness of stealing away time for leisure. In this sense, m-reading may bring into these readers' lives the new sort of respite that once propelled the very success of fiction reading among female audience, beginning with romance novels (Lyons, 1999; Radway, 1984). To further substantiate the parallel, female readers in their middle years have indeed been reported as the most avid adopters of e-books (Kobo, 2016), and there is evidence on global scale of distinct genre patterns in publishing following the digital turn, with a vast majority of e-books sold around the world currently belonging either to the romance, fantasy or crime genre (Kobo, 2016; Kovač and Wischenbart, in press).

The above are only a few of the possible affects disregarded by Mangen (2008, 2016) that can make mobile phones and other digital devices instil value-positive alterity relations consonant to the pleasures sought from fiction. Needless to say, we acknowledge the fact that mobile phones need not be associated with positive affects across all readers and situations (Samaha and Hawi, 2016; Schilhab, 2017a).

Situated embodiment

The embodiment, hermeneutic and alterity relations are defined by neither Ihde nor Mangen as categorically exclusive. Rather, traces of all three are assumed to be present in any instance of human–technology interaction, with one of them being particularly salient to the user's consciousness (Ihde, 1991: 75; Mangen, 2008: 415). Our previous subsection goes another step further in suggesting that an alterity relation to one particular aspect of a device still allows, and sometimes even facilitates, an equally salient hermeneutic relation to another aspect of a device. But embodiment relations are not excluded from the equation either. Again, the mobile phone, when used for fiction reading, may illustrate precisely that

As a reading device, the smart mobile phone combines, among other things, the following technological attributes:

Versatility: the phone provides access to a potentially unlimited wealth of reading materials.
Facility: the phone can be operated with the fingers of one hand.
Availability: the phone is worn on the body and thus constantly available (see also Wei et al., 2012) for reading, pending battery life.

While the former two attributes also apply, to some extent, to other devices such as dedicated e-readers, constant availability is less typical for how dedicated e-readers are used, given their greater size, and the combination of the three attributes endows the smart mobile phone with some unique affordances for the embodied and situated experiences of fiction reading.

The benefits and exemplary uses of availability have already been mentioned above. m-Readers capitalize on this attribute to trade in the mind wandering or boredom potentially awaiting them during the daily commute, in checkout lines or waiting rooms, for mood management via fiction reading. Availability entails that this requires no planning on their part. The attribute of facility, in turn, enables them to begin reading within the few seconds it takes to retrieve the device from a pocket, swipe the screen with their thumb and press a button. More importantly, it enables them to read without any additional physical support also while holding onto a railing, carrying a sleeping infant, or undergoing intravenous therapy (Hupfeld et al., 2013; Kuzmičová et al., 2017). In such scenarios, print books are less convenient as leafing through and holding a print book with the same hand can be difficult. It is in such scenarios that the highly facile smartphone is particularly likely to achieve phenomenal transparency between reader and text by virtue of becoming assimilated in the corporeal schema, that is, 'the set of tacit skills that characterize action in the world, and which structure one's experience' (Colombetti and Krueger, 2015: 1161). Especially in nontraditional reading situations, the device can then serve as an extension proper of the reader's body.

Moreover, there is another way for mobile devices to strengthen the entanglement of body and text experience, which adds a new dimension to the situation constraint while also capitalizing on the last remaining attribute, the device's versatility. A particular case is that of dedicated smartphone apps offering environment-related fiction feed at specific GPS coordinates. One example is

the LitLong: Edinburgh mobile app developed by the Palimpsest project (Alex et al., 2015). At selected sites in Edinburgh, its users are offered literary excerpts from works historically and thematically related to these sites. Commercial campaigns exploiting similar principles have also been introduced. For instance, upon launching a 2015 novel whose key events take place on a train, Random House Publishing reportedly supplied free excerpts to railway passengers (Maloney, 2015). These applications rely for their effect on enhancing the inherently situated nature of fiction reading, that is, the capacity of the bodily experience of physical environment to prop one's mental imagery and/or boost one's overall aesthetic pleasure and motivation to read (Kuzmičová, 2016).

There is also an abundance of emergent nonlinear storytelling techniques that rely on ubiquitous computing and less traditional text formats to deploy the propping potential of physical environment at new levels of artistry (Farman, 2014). These techniques tend to rely on spoken text in either audio or video format, often operating in a grey zone between fiction and non-fiction (Farman, 2015). The readers' mobile phones thus offer site-responsive content that is not only created specifically for the purpose but also intended to be co-created in one's concurrent experience of the environment and awareness of on-site text such as information signs. One of the more ambitious genres in this family of mobile narratives, the genre of ambient literature (Dovey, 2015), makes the reader/listener actively interact not only with their environment through purposeful exploration but also with the structure of the narrative proper through navigating its multiple-choice features.

As an illustration of the uniquely situated embodiment of m-reading, these innovations are clear but far from widespread. In most cases of m-reading, the hermeneutic process is environmentally propped in less artistically orchestrated and technologically complex ways. While touring Rome, for instance, m-readers can deliberately access collections of the Latin classics, or a contemporary crime novel set in the same city, to read during breaks. Alternatively, they may use their device to search for Roman sites of particular interest on Wikipedia and come across links to online literary content to immerse in, its local relevance potentially enhancing their immersion (Kuzmičová and Bálint, in press). Thus, m-reading introduces into fiction experiences previously unknown levels of what media and communication scholarship terms incidental, as opposed to intended (Tewksbury et al., 2001), exposure. Due to the unique combination of versatility and availability, more generally, m-readers have increased chances of finding an optimal fit between fiction and physical environment insofar as they are free to manipulate both variables. Upon deciding to read difficult romantic prose, they may deliberately opt for consonant (e.g. the woods) or dissonant (e.g. a modern café) settings of their choosing. Conversely, on a rare walk through the woods, they may suddenly become tempted to reopen a romantic work previously discontinued, for example, for reasons of complexity (see also Kuzmičová, 2016). The storage capacity of the m-reading device allows them to carry around an entire library of texts to choose from according to the instantaneous situation.

To sum up, Mangen (2008, 2016) assumes that a device's capacity to enter embodiment relations is fixed, whereas we argue that it is relative to situation. The phone's haptic salience and the intangibility of the digital text may indeed be experienced by many as alienating if met in the comfort of a personal library, yet the constraints of less traditional reading situations can make these features recede into phenomenal transparency. In addition, we have shown that by virtue of a unique combination of versatility, facility and availability, mobile phones allow more embodied mediation between readers' immersion and physical environment than other reading devices.

Attention and immersion

Mangen is concerned with the future of immersed fiction reading. Apart from pointing to the alterity relation allegedly called forth by digital reading devices, she is also wary of the attention discomfort brought about by hypertext in particular (Mangen, 2008) and digital devices more generally (Mangen, 2016). She suggests that digital devices disrupt the reader's attention due to their haptic capture, that is, the invitation to change the display by clicking, which ultimately leads to a sense of impatience and concomitant shallow processing.

In m-reading, susceptibility to distraction is of course relevant. To a lesser or greater extent depending on each user's settings, the smartphone is *devised* to be distracting by means of the diverse applications instantaneously at work. Unless personal alerts and other mobile features are switched off prior to reading, a practice m-readers are free to adopt, the risk of being distracted by beeps and blinks from the margins of the screen is imminent.

We have no intention of denying the inherent potential of digital devices to distract readers with concurrent offerings, likewise a matter of concern for Mangen (Mangen and Kuiken, 2014; Mangen, 2016) and many other reading specialists (Baron, 2015; Wolf and Barzillai, 2009). It should be noted, however, that certain levels of digital distraction threat apply to all reading irrespective of support, print books included, because the technology is now ubiquitous and typically within earshot and reach. For a balanced view of m-reading in particular, moreover, we wish to invoke the notion of the situation constraint in emphasizing the following. Few m-readers use the mobile phone as their only, or even primary, device for fiction reading. As previously mentioned, many report to combine devices, print books included, according to convenience. The typical situation in which they resort to reading on their phone, then, is a situation that abounds in unwelcome extraneous stimuli, for example, the daily commute or the supermarket checkout line. Alternatively, the lack of extraneous stimuli, for example, in a doctor's waiting room, is such that one would otherwise be left at the mercy of – potentially undesired (Killingsworth and Gilbert, 2010) – mind wandering. The time spent m-reading may largely be time stolen away in between other activities; exploratory research has shown that readers can sometimes find print volumes bulky to the point of distraction, and even uncomfortably conspicuous vis-à-vis one's immediate social surroundings, for the purposes of such reading (Kuzmičová et al., 2017). That said, we would like to suggest that m-readers may often be exceptionally motivated to sustain their attention on the text as they work to avoid negative affect from their immediate situation (see also Hupfeld et al., 2013), at times perhaps more so than a print reader who sets aside an entire afternoon for reading in a specially dedicated environment. Categorical associations between digital reading and inattentiveness are thus not fully warranted.

Types of attention

An informed discussion of the attention processes potentially involved in natural m-reading scenarios must draw on the cognitive and neurosciences. A key distinction there is one between exogenous attention, that is, attention directed at external stimuli, and endogenous attention, that is, attention directed at mental contents. When attention is engaged by external stimuli the resulting mental state may be conceived of as the 'possession of the mind by objects', whereas mental states resulting from engagement with internal stimuli are better referred to as 'trains of thought' (Chun et al., 2011). In the context of m-reading, the chatter of fellow passengers or the movement of shopping carts in the checkout line to one's side, but also the text being read *qua* series of signs on a

screen, are typical objects of exogenous attention. Objects of endogenous attention encompass the inner experiences – concepts, affects, memories and mental images – triggered by the text.

Exogenous attention can then be further subdivided (Chun et al., 2011). It can operate top-down and be voluntarily moved, for example, from the phone-borne e-book to the checkout line in order to see how far one has advanced while reading. Alternatively, it can operate bottom-up and be stimulus-driven (Schilhab, 2015b), for example, towards the same checkout line when two shoppers farther ahead suddenly begin to quarrel or towards a beep announcing an instant message. The main distinction between exogenous and endogenous attention has been corroborated by neuroimaging studies (Vanhaudenhuyse et al., 2011) that detected two separate cortical systems mediating conscious awareness, one for perception through the sensory modalities (e.g. visual, auditory, olfactory and interoceptive) and the other for mental processes decoupled from external stimulation (e.g. mind wandering, daydreaming, inner speech and mental imagery).

Understanding what controls the dynamic between exogenous and endogenous attention, that is, what triggers the dominance of one over the other, seems crucial to our understanding of m-reading (e.g. Abrahamse et al., 2016). Natural m-reading environments differ with respect to their demands on exogenous and endogenous attention processes. Because exogenous attention engages with extraneous stimuli, environments rich in potential stimulations of the senses (a supermarket checkout line) may claim exogenous attention more than relatively perceptually deprived environments (a waiting room at the doctor's). m-Reading in the checkout line would then be more prone to external disruptions than m-reading in the waiting room where people usually lower their voices and avoid excessive physical activity. All other things being equal, a successful checkout line m-reader will need to exercise more mental control to avoid diversion of attention and sustain immersion.

However, environments do not always have to present meagre opportunities for perceptual stimulation in order to successfully encourage immersion. For instance, studies showing the cognitive benefits of outdoor nature experience suggest that it is in fact the unique and complex combination of a variety of stimuli in nature settings that yields cognitive improvement – and not a lack of stimulation per se (Bratman et al., 2015). The same is true even for built environments. For instance, one might argue that given the ample perceptual stimulation imposed by the traditional library, with book spine after book spine in any number of colours and formats walled up, it should be relatively difficult to achieve the peace and quiet required for immersed reading. However, just like waiting room behaviours are driven by expectations resulting from numerous experiences of waiting rooms, library behaviour is likewise partly guided by our perception of how other people behave as well as what we expect to be the appropriate behaviour in and of the room. Thus, in some instances, culturally driven habits may overrule and blur the immediate potential of environmental stimuli to engage exogenous attention. Salience of external stimuli is not just a physical attribute. It is also guided by emotional, cognitive and motivational factors (Sood and Jones, 2013).

More generally yet, the reorientation of our attitude and response to environmental stimuli depends on learning which can be socially but also individually determined (Hasse, 2015; Schilhab, 2015a, 2017b). This means that also individual m-readers who frequently read in checkout lines may in fact develop environment-resistant immersive skills. Subjective self-reports of digitized reading overall attest to readers consciously working to develop self-regulating strategies in this vein (Kuzmičová et al., 2017; Rose, 2011). The ability to ignore external stimuli and focus on inner contents depends on what cognitive scientists call executive functions. Executive functions are in use when we concentrate and think. Importantly, they are trainable (Brehmer et al., 2012; Klingberg, 2012). Moreover, the performance of multiple tasks in quick succession, for

example, finding the last passage read, reimmersing in the text, all the while non-consciously monitoring the progression of the waiting line, can also improve due to training. Thus, skilled m-readers may actually improve their ability to voluntarily and rapidly switch between these different tasks requiring different attentional states across the exogenous/endogenous divide (Burak, 2012).

There is evidence that the adoption of smart technology and mobile phones fosters previously unusual ways to learn and cognize in the individual (Loh and Kanai, 2016). As opportunities for distraction increase (Kraushaar and Novak, 2010), one could hypothesize that various self-regulatory strategies to counterbalance the effects will also increase. Although smart technology-induced multitasking is generally assumed to lower cognitive performance (Ophir et al., 2009), researchers disagree on the extent of this effect in more experienced multitaskers (Alzahabi and Becker, 2013). Individual metacognitive inclinations add to the set of putative confounding variables, as those having a dispositional tendency to remain implicitly or explicitly aware of multiple perspectives of a situation seem better at media multitasking (Ie et al., 2012). However, Mangen's (2008, 2016) argument disregards the possibility that readers may gradually, pending personal dispositions, improve the ability to switch between tasks requiring the full attention of the conscious mind.

Types of immersion

Since the publication of Mangen's (2008) essay on hypertext fiction, experimental findings have suggested that in the reading of digital linear text, some aspects of immersion can indeed be inferior to those observed in print reading. It should be noted, however, that the studies in question were conducted prior to the introduction of the latest generation of high-resolution screens such as Apple's Retina display. Mangen et al. (2013) found that readers have greater difficulties comprehending an expository text presented on a computer screen, in *.pdf* format, compared to when the same text is read from a paper booklet (see also Wästlund et al., 2005). In a different experimental design, Mangen and Kuiken (2014) had participants read a short suspenseful narrative from a print booklet versus tablet while manipulating their genre beliefs and administering various self-report measures. The tablet condition overall was associated with higher self-reported awkwardness in handling the text, along the lines of a value-negative alterity relation. This effect was independent of participants' previous experience of digital reading.

These and similar experiments leave a number of questions unanswered with regard to the situation constraint. For instance, the experimenter-supplied digital devices probably did not invite personalized positive affect, regardless of the participants' degree of tablet adoption in natural conditions. The laboratory environment as such and the stimulus text presumably also diverged from the participants' natural reading environments and selections. As issues relevant to affectivity, embodiment and environment have been addressed in previous subsections, we will now focus instead on revisiting the specific understanding of phenomenological immersion that informs Mangen's underlying concern with the future of reading. We wish to point out that there is more to immersion than what can be measured in relation to the exact time period spent processing a discrete text passage.

Following Ryan (2001), Mangen (2008) uses the term phenomenological immersion – rather than just immersion – in order to distinguish one's engagement with a story proper from engagement with the physical reading device, which she calls technological immersion. In more recent work, Mangen (2016) occasionally replaces phenomenological immersion with the broader term of deep reading (Wolf and Barzillai, 2009). The instrument used to measure

phenomenological immersion, or depth of reading, in Mangen's empirical work is the so-called Transportation Scale, developed by Green and Brock (2000) in the theoretical traditions of Nell (1988) and Gerrig (1993). Transportation is a psychological construct comprising the reader's attention, imagery and feelings in relation to the story being read, wherein the reader is understood to undertake a journey into the world of the story while leaving his/her own world behind temporarily. An additional finding of Mangen and Kuiken's (2014) experiment, for instance, was that the print readers' self-reports indicated an association between transportation on the one hand and empathy with story characters on the other. This association was not observed in participants reading from tablets.

A problem inherent in using the Transportation Scale and similar instruments is that they model the reader's immersion as inversely related to any concurrent experience that does not concern the text narrowly defined. That is, readers' immersion is modelled to take place in some kind of experiential vacuum, in isolation from other stimuli external and internal. This issue has been critically addressed in situated accounts of reading (Kuzmičová, 2016; Kuzmičová et al., 2017) and becomes especially salient if we consider the constraints of m-reading. On a mobile phone, but also on other devices including books, a single work of fiction is typically read in snippets over an extended period of time, sometimes several weeks or even months, with numerous breaks between sessions. During these breaks, which are typically excluded from experiments for practical reasons, an unfinished work of fiction continues to exert its effects in what is not measurable with the Transportation Scale but may rather be termed *long-term immersion*. Long-term immersion should be understood as an inclusive term encompassing all sorts of fiction-induced experience ranging from scattered reflections on past and future plot or character development, to brief flashbacks of mental imagery, to effects as subtle as indistinct moods invoked by the overall qualities of a given book. Unlike immediate immersion as measured by the Transportation Scale, long-term immersion operates in the background of readers' other activities. It is long-term immersion that makes us continue to 'live with' a piece of fiction beyond instances of reading proper (see also Kuzmičová and Bálint, in press; Mar et al., 2011).

Phenomena relevant to long-term immersion have mostly been documented outside the specific realm of reading, especially with regard to fiction television. For instance, there is an extensive literature on the so-called parasocial interactions, wherein viewers create various types of affective attachments to characters, engaging with them imaginatively outside viewing time (for a review see Giles, 2002). Such parasocial interactions have been proposed to serve as training for real-life situations (Madison and Porter, 2016). Given the evidence concerning the long-term effects of fiction reading on social cognition (e.g. Djikic et al. 2013; Kidd and Castano, 2013; Mar et al., 2009), some of these findings can likely be generalized across all fiction media including writing (see also Mar et al., 2011; Schramm and Wirth, 2010). In the background of their mundane activities, media audiences – including fiction readers – continue to process fictional characters' social relations or deeper behavioural motives. They may query these characters' psychological similarity or dissimilarity to themselves or even engage with them in imaginary dialogue (Madison and Porter, 2016). Imaginary dialogue with characters, specifically, and a general openness to adopting fictional characters as imaginary peers, has been repeatedly documented to occur in fiction readers (Miall and Kuiken, 1995).

It is possible that immediate immersion in the sense advocated by Mangen (2008) is not a particular strength in m-reading when compared to traditionalistic reading practices associated with print. We would like to suggest that m-reading, on the other hand, may be exceptionally suited for maintaining long-term immersion. m-Reading allows readers to reduce the necessary intervals

between reading sessions to a minimum, thus constantly re-establishing contact with the fictional stimulus. Because the mobile device is always available, m-readers hypothetically run reduced risk of forgetting about characters or falling out of the general affective sets that enable them to enjoy a given book. Moreover, parasocial interactions with characters and other social-affective aspects of long-term immersion stand in consonance with the deeply social bases of mobile-supported mood management, as mobile users have been reported to primarily cherish their devices in their capacity as containers, displays, processors, and sources of interpersonal relationships (Dias, 2016; Serrano-Puche, 2015; Vincent, 2005, 2013).

While book openings may tend to require more extended and deeply focused immersion, in the immediate sense, for readers to become sufficiently interested in a particular story or attuned to an author's style (Burke, 2011; Burke and Bon, 2018), later returns need not be as demanding. That is, typical m-reading scenarios such as the daily commute may primarily be suited for situations where the reader's initial levels of interest have already been set. As long as m-reading is mainly used as a complement – rather than an exclusive alternative – to long-form reading from other devices (including print), it does not have to compromise readers' overall ability for the baseline immersion that is necessary for continued reading. Typical m-reading scenarios such as the daily commute are admittedly subject to limitations insofar as their physical setting can sometimes be too distracting, uncomfortable or aesthetically unpleasing (Kuzmičová, 2016) to afford an immersive reading experience in the first place. Yet these limitations apply to all reading outside experimental conditions, irrespective of device.

In sum, Mangen (2008, 2016) argues that digitization may compromise readers' capacity for phenomenological immersion. In response to this argument, we have introduced the distinction between immediate immersion, that is, reader engagement that is measurable during or immediately after text processing proper, and long-term immersion, that is, engagement processes that occur during pauses in natural fiction reading scenarios. While some aspects of immediate immersion may indeed be negatively affected by the relatively intermittent nature of m-reading, there is reason to expect that long-term immersion may increase rather than decrease in frequent m-reading.

Conclusion and future research

Applying a situated perspective (Kuzmičová, 2016) to Mangen's (2008 and later) embodiment-based accounts of digitized reading in general, this essay isolated four areas for future empirical investigation into the embodied experience of m-reading specifically. The first area is affectivity, wherein readers' positive relationship to their m-reading devices may hypothetically enrich rather than impoverish their pleasure and benefit from reading. The second area is that of m-reading's unique embodied and technological affordances, which allow readers to enjoy reading in more situations, as well as in closer fit between text and situation, than ever before. The third area is attention training, which may be supported by frequent m-reading in ways that do not necessarily have to compromise readers' individual ability for immersion. The fourth and last area is that of immersion itself, which needs redefining to encompass readers' engagement beyond instances of reading proper before more knowledge on the actual effects of m-reading can be generated.

None of the four areas are easily operationalized in established experimental designs, but their full exclusion from research would severely delimit our understanding of digitized reading. Therefore, exploratory work needs to be pursued first to capture m-reading as it naturally occurs outside the laboratory. There are a few extant studies to build on. One such study is a diary study by

Hupfeld et al. (2013), in which participants were asked to document their e-book usage across devices over an extended period of time, while also recording their instantaneous situation through photographs. The photographs and diary records were then used as prompts in follow-up interviews. In the future, Hupfeld et al.'s (2013) design could be refocused on m-reading in multiple ways, for example, through constraining data collection to the reading of one particular story of the participants' choosing. The interview part would then be structured around the key areas of the present essay, perhaps most productively that of long-term immersion. Reading on their phone, will readers report feeling more strongly connected (Vincent, 2005) to story characters by always carrying the text in their pocket, on the very device where their real relationships are managed? Or will they rather tend to forget about the story all the more quickly?

In turn, the area of reader–device affectivity, that is, the question of whether m-readers cultivate particular types of affective or even aesthetic attachment to their device as they use it for reading, and the area of situated embodiment, that is, the question of how m-readers match fiction content to physical environment (Kuzmičová, 2016), may require more generalizing exploratory perspectives. For instance, Fortunati and Vincent (2014) and Taipale (2015) have previously collected rich data on digital versus print reading on the basis of student essay assignments on the topic. Alternatively, Kuzmičová et al. (2017) have run focus groups on everyday reading environment preferences in relation to different devices. These two methods could be combined in preparation for quantitative designs such as surveys and experiments.

The area of attention training, finally, is the most difficult of the four to explore through qualitative research relying on m-readers' self-report alone (see Schilhab, 2017a). As it most obviously concerns long-term cognitive change of a sort that may often be inaccessible through instantaneous self-observation, it must be studied using third-person methods, control groups and longitudinal designs. By listing it alongside the areas of reader–device affectivity, situated embodiment and long-term immersion, we have heeded Mangen's (Mangen and Schilhab, 2012; Mangen and van der Weel, 2016) call for radically cross-disciplinary outlooks on digitized reading. We have also highlighted how readers' attention and affect, albeit amenable to vastly different observation methods, are closely interconnected through motivation. In the case of m-reading, the kind of motivation at work is the overburdened individual's urge to maintain leisure reading with any means available, including the mobile phone.

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