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## Creative Contingencies : A Model for Literary Writing from 4E Cognition and Predictive Processing

Karin Kukkonen (University of Oslo)

[k.b.kukukkonen@ilos.uio.no](mailto:k.b.kukukkonen@ilos.uio.no)

### [Abstract]

This article presents a model for analysing creative writing through the frameworks of 4E cognition and predictive processing. Creativity is conceptualised through contingency – namely, the sense that things do not have to be the way they appear to us now. Writers integrate contingency into their practices, by provoking and by managing it, and they design literary forms where the contingent is given shape in alternative worlds, strange minds and plot events that depend on the unexpected. When working on a draft, writers alternate between material agency with its spontaneous processes and epistemic agency with its cognitive control. Writers often also embed other texts, fictional minds or representations of writing and reading. I will discuss this process as “mise-en-abyme modelling”, where the tension between material contexts and representations becomes productive. My proposal provides an alternative to traditional, linear process models of writing or creativity more generally. Instead, it traces the interactions between contingency, form and practices through the recursivity between material engagements and fictional representations.

Keywords: Creativity; 4E Cognition; Predictive Processing; Literature

### [Article]<sup>1</sup>

Creativity has been approached as a personality trait in producers, a describable quality of the final product or a cognitive process that can be analysed across domains. Yet such a domain-general approach has been challenged in recent creativity research. For example, high scores on standard tests of creativity (such as the Torrance test) in the modality of verbal expression do not predict high scores in the modality of (mental) imagery (Baer 2022). A new approach, starting from specific domains and media contexts in which creativity plays out, needs to be developed (Abraham 2022). Also socio-cultural contexts are a major theoretical concern in recent stock-taking in the study of creativity (Sternberg et al. 2024). It is exceedingly difficult to discuss creative processes in literary writing systematically, because essentially any element of the process (writing and revising), the product (a novel, for example), and the person (the writers’ particular personality and social background), can play into literary writing. Domain-specific, culturally embedded and fine-grained analyses are called for to get a better grip on creativity conceptually. 4E cognition may answer that call and provide an approach that understands creativity as an *embodied* practice, as *embedded* in lifeworlds, as *extended* into writers’ engagements with the technologies of language, reading and writing, etc., as well as *enacted* in the way in which they perceive the world, its regularities and contingencies. In this article, I propose to provide such a model, drawing on the frameworks of 4E cognition and predictive processing for the case of literary writing, which understands creativity as a profoundly embodied, material and contextually embedded endeavour. The model provides the

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précis of a long-term research project investigating the practices of novelists through interviews, manuscripts and the literary texts themselves (see Kukkonen forthcoming).

Elements of a 4E approach to creativity in literary writing are already available. Keith Oatley and Maja Djikic (2008) look at “writing as thinking” in order to show how the materiality of writing on paper “externalises thought” and allows writers to devise particular stylistic solution, while Marcelle Freiman (2015) highlights the dynamics of revision processes on paper, and Marco Bernini (2014) foregrounds how writers work as a “coupled system” with their writing materials in order to shape mental imagery and language. All these accounts look at what authors actually do, and then relate these activities to larger models from 4E cognition. What makes these actions particularly creative?

Let me start with a classic example of how a writer manipulates language in the writing process in order to achieve a specific mode of expression: Kafka’s shift from first-person to third-person narration when writing his novel *Das Schloss*. Dorrit Cohn (1968) points out that the first forty-two pages of the manuscript were written in first-person narration, before changing the “I” of the narrator-character into the letter “K”, leading to third-person narration. Cohn shows in her analysis of the revisions that Kafka leaves almost every other aspect of the first-person narration intact, despite the change of pronoun. Kafka’s changes create a hybrid between first-person narration and the “figural mode” of the novel in third-person narration where the narrative tells itself through the focalisation of a character (see Cohn 1968, drawing on Franz Stanzel’s terms). Kafka likely made the change because so many elements of the novel pointed towards a third-person perspective: The first-person character does not seem to take a particular position in the fictional world, he does not disclose what is going on in his own mind, nor does he take a temporal distance between the experience he narrates and reflections from hindsight. As Cohn puts it, “The ‘Urschloss’, as we have seen, stretches the first-person form to a point where Kafka felt the K revision was not only possible but mandatory” (1968: 42). Yet at the same time, the novel does not fully gel into the figural mode of narration, the resonance of the initial first-person narrator arguably underlies Kafka’s uncanny focalisations.

What makes these processes creative is the way in which contingency gets integrated into the practice of the writer as well as into the developing form that shapes the literary text. We can think of such contingency across multiple levels:

1. Kafka realises that his story does not have to be written in the first person. An element of the literary form is revealed to be contingent, that is, not necessarily required. Such a contingent find, then, affects the entire style and expression of the novel, as Kafka decides to carry on with the third person.
2. The sensorimotor contingencies implied in the linguistic representation are manipulated in the written text, as Kafka melds two epistemic stances through the revision of the pronoun. It is also conceivable that the sensorimotor contingencies of the material itself get activated in the process, for example, if a writer decides to cut out sentences and then shuffles the paper slips, revealing new possible sequences.
3. Contingencies can arise in any moment of the writing process: As Mark Harman’s (2002) study of the entire set of manuscripts for *Das Schloss* shows, Kafka initially wrote a first draft fragment in third-person narration (the so-called, “Fürstenzimmerfragment”), and only then started the main manuscript, analysed by Cohn. The change of pronoun resonates through the long writing-process behind the novel.

Contingency across the form of the text and the practice of writers then activates creativity in a 4E setting. The Kafka example now allows us to sketch out the challenges for a domain-specific model for creativity in literary writing:

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1. Creative practices include both unplanned and conscious elements of agency.
2. A manipulation of the material surface can lead to fundamental changes in the representation, and vice versa.
3. A change in creative practices is rarely localisable in a particular moment in long process of literary writing. Contingency can be provoked in processes of idea-generation, it can emerge during a moment of insight, or when a narrative is written anew in a second version.

In what follows, I will discuss how creative practices combine the modes of material and epistemic agency, how they generate interactions between material and representational aspects of writing, and how such interactions lead to recursive loops, rather than a linear line of development, between practice, form and contingency.

#### [Material and Epistemic Agency]

Literary studies has more or less declared a moratorium on studying creativity, since it is impossible to reconstruct the intentions that go into any particular literary work (Wimsatt and Beardsley 1946), and texts have their own dynamics in the intertextual space of literature that usually go beyond the conscious control of writers (Barthes 1977). Also approaches from 4E cognition foreground the spontaneous and unplanned quality of the creative process. Bernini (2014) draws on Lambos Malafouris' (2008) work on "material engagements" in pottery, which Malafouris (2014) developed more recently also for aspects of creativity in our engagement with the material world. Such processes of material agency are not initially planned in the head and then executed on the page. Instead, the creative process happens in the on-going encounter between writer, pen and paper, called the "coupled system" in the extended-mind framework (see Clark and Chalmers 1998). Such material agency arguably can be read as a phenomenological expression of cognitive processes usually characterised as "spontaneous" (such as mind-wandering, memory, imagining, etc.) and linked to creativity in the cognitive sciences (see Abraham 2019). Not everything is spontaneous, however, in the creative process of writing a novel or a short story: Even if writers do not plan out the entire writing process beforehand, they make a conscious decision to sit down and engage in the project, devise plans for writing and, perhaps, choose to lock away a manuscript if they are unsatisfied with it. All these processes can be described as exercising "epistemic agency". Epistemic agency has been discussed by Thomas Metzinger (2015) as the kinds of action in which agents retain at least a minimum of "veto control" that allows them to stop what they are doing, and in which they can also readjust the course of their actions. Regina Fabry draws on Metzinger and suggests that an "epistemic agency" that is "strongly embedded in the cognitive niche" (2018) is in fact typical of creative processes. Different from examples of "weak epistemic agency", such as rumination, writers have a modicum of control over their mental processes and anchor them in the cognitive niche of the practices and technologies of writing. In particular for the long-term processes of literary writing, where writers produce a novel over several years, material agency is continuously supplemented by epistemic agency.

Material and epistemic agency are both anchored in the material environment and in writers' embodied skills. Material agency refers to processes where writers are in the ongoing "coupled system" of writer, pen and paper, while epistemic agency refers to processes that modulate the environment or writer's actions. Writers can draw on existing "affordances" in the environment, that is, the potential for action entailed by the spaces they work in, or devise new affordances by rearranging their environment or work with new technologies (see Wheeler 2018 for examples from music). Writers can also exercise conscious control at different points before, while or after the operations of the "coupled system". Rather than foreground material over epistemic agency or vice versa, there appears to be an ongoing give and take between these two modes of agency in creative

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practice. Such an approach does not propose identifying any particular, preformed intention that would manifest in the creative work, which would be more or less impossible; instead, it enables a fine-grained analysis of different aspects of writerly practice across their highly individual projects.

The expertise of writers lies precisely in having a sense of when it pays to give free reign to the spontaneous processes grouped under “material agency”, working for example with mind-wandering or dream-material, and when they should exercise the planning or control processes grouped under “epistemic agency”, choosing for example to call it a day, drawing up a preliminary table of contents or change the strategy they currently deploy.<sup>2</sup> Indeed, it can be considered an intentional decision to “omit” conscious control and move into material agency in a session of “automatic writing” (see Arango-Muñoz and Bermúdez 2021), or writers can move from an unexpected effect that emerges in playing around with personal pronouns into a more conscious phase of revising the manuscript pursuing this principle. Having a sense of when to follow material agency and when to drive the process through epistemic agency is exactly the “embodied skill” of writers, conceived in parallel with embodied skills of other expert populations, such as cricket players, cyclists, etc. in the work of John Sutton and colleagues (2011). What may look like automatic action is actually a carefully calibrated modulation on the expert’s action, prepared by long-term processes of training and enculturation, and brought to bear in the on-going action. While writers mostly do not train sequences of motion, their embodied skill in writing and deploying the flow of language, as well as in manipulating paper and words on the page or on the screen, similarly depends on bodily actions that can be understood as “patterned practices” that make long-term enculturated knowledge available in the ongoing flow of action (see Menary 2014; Roepstorff et al. 2010).

Contingency clearly plays a role in material agency, but it is also central for epistemic agency. Material agency refers to actions that are largely explorative, discovering the possibilities of the space in which the writer works, be that in the sequence of words on the page, in how the manuscript is handled or in how the writing process is organised. Turning a page up-side down to start writing from the other end, that is, playing around with the “sensorimotor contingencies” of the material, can open remarkable creative potential. Kafka’s choice to replace the personal pronouns similarly constitutes an act of playing around with the sensorimotor contingencies in the embodied aspect of language, reshaping the stance from which the narrative is perceived (see also Trosianko 2014). Epistemic agency can also be deployed to increase contingency in the process, for example, when a writer chooses during a writing session in a café to proceed by writing descriptions of people as they pass by, contingently, when she chooses to shift from one language into another, or when she writes out a series of “secret rules” to find productive constraints in the writing process. Georges Perec, for example, chose to write a novel without the letter “e”, called *La Disparition*, strongly controlled so as to make word choice contingent not on the established patterns of likely word sequences in French

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<sup>2</sup> Material and epistemic agency can be understood as the phenomenological expressions of underlying neural processes of the default-mode network (mind-wandering, memory, dreams, etc.) and the executive control network. For the context of neuroscience, Arne Dietrich (2015) has argued that creativity cannot be localised in one area in the brain alone but needs to be seen in context with a whole range of everyday cognitive faculties. He suggests that there are processes of flow, as well as “sighted”, deliberate processing approaching the possibility space top-down and “blind”, spontaneous processing approaching it bottom-up, at play, and also argues for a fluid interplay between these processes. Dietrich links his account to predictive processing on the neuronal level, whereas I pursue the links through the more readily embodied aspects of sensorimotor contingencies in what follows.

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but on what vowels the word contains. Contingency is provoked, but then in the creative process also managed when it gets inscribed into the developing design of a literary text.

Indeed, processes we call creative tend to modulate contingency. On the one hand, they disrupt the sense that something is necessarily the way in which it appears to us, and on the other hand, they also devise material, linguistic and narrative structures that frame such a sense of an alternative state of things and make it accessible to readers.<sup>3</sup> I have described the latter case in terms of “probability designs” (Kukkonen 2020). These probability designs provide a “designed sensory flow” of words in a narrative that shapes readers’ sense of what is likely. Predictive processing, a framework that foregrounds expectations and judgements of probability in cognitive processes (see Clark 2016; Hohwy 2013), suggests that predictions and probability judgements shape how we perceive and act in the world. We have a “generative model”, that is, a sense of statistical regularities that allow us to infer what may have caused the events we perceive. When these predictions are shown to be mistaken, we revise them in the light of new evidence about the world (and about how likely we think that this new evidence is reliable). Our embodied experience is driven by predictions (for example, about how a movement is going to work out), susceptible to new evidence in the environment (for example, obstacles in our way), and adjustments to that new evidence or taking new affordances into account (for example, taking a different route or leaping over the obstacle). Applied to reading a literary text, readers’ predictions are constantly modified by what they read about events in the fictional world, but also by signals about how reliable that information is, for example, through what they know about a character who recounts particular events. Kafka’s strange narration highlights that such a “designed sensory flow” in literary probability designs can reshape our perception of the world in the ongoing flow of reading beyond what is generally practicable in everyday perception (see Kukkonen 2020; 2023).

Predictive processing generally posits a model for cognition that drives towards “prediction error minimisation”, that is, making the world more predictable. Yet we often don’t seek out the most predictable environments. As Andy Clark puts it, we don’t lock ourselves up in a “dark room” (2013). Predictive processing conceives of the process of seeking and finding novelty as developing “cognitive grip” in the environment (Kiverstein et al. 2019). “Grip” depends on “precision”, that is, an assessment of how reliable the inferences are that we draw in cycles of prediction, prediction error and revised predictions. Precision provides a second-order judgement of how likely it is that one is on the right track, and it can be adjusted on the fly in the on-going process of action (see Friston 2010). Kiverstein et al (2019) highlight its relevance for novelty-seeking and play: These activities get more and more pleasurable the more one has a sense of being on the right track, that is, the faster the sense of precision increases. Estimating precision is tied to “bodily feelings in the form of affordance-related states of action readiness” (2019: 2855). Prediction errors are reduced at an unexpectedly fast rate, yielding a pleasurable experience, and hence they turn into something to be sought out in play and novelty seeking.

To address creativity specifically, Constant et al (2023) run a computational simulation of predictive-processing agents in different conditions, with more or less predictable environments (“stable” or “dynamic environments”) and agents with a more or less strict sense of how reliable information needs to be (“stable” or “dynamic minds”). The computational “proof of principle” then deploys the standard “alternative uses” test to measure the creativity of agents. Constant et al. argue that

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<sup>3</sup> Indeed, if one wanted to map out different kinds of contingencies, one could do hardly better than reading literary texts depending as they do on alternative takes on the world, coincidences and counterfactualities of plot (see Dannenberg 2008), and historically and cultural variety in their probability designs.

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creativity can arise in agents modelled through the principles of predictive processing in three of the four conditions: stable mind and dynamic environments, dynamic minds and stable environments, as well as dynamic minds and dynamic environments. They describe these conditions as “exploratory bubbles” and suggest that such situations are provided, for example, by the arts or by science, “moving the goalposts” for processes of error minimisation.

“Exploratory bubbles” would be exactly the kinds of spaces where a faster than expected rate of prediction error reduction can take place. Indeed, Kiverstein et al. (2019: 2864) speak of “progress niches”, which have exactly the right kind of “slope” to speedily increase precision. Such “cognitive grip” can also be scaffolded by visual works of art in the way in which composition and colour choices allow the observer to reduce their prediction error at an unexpectedly fast rate yielding a positive emotional state in observers (even if what they perceive in the painting is not necessarily a happy *sujet*; see van de Cruys 2017). A similar argument can be made for the probability designs, the form, of a literary texts. Readers are often faced with unexpected plot events or strange perspectives, but then the design of the literary texts scaffolds the meaning-making process (see Kukkonen 2020). However, we cannot assume that the reading experience maps directly onto processes of writing.

Writers do not have this kind of scaffolding in place when they set out to write a novel. The novel is an ill-structured problem: It is not clear how long it needs to be, it can have one protagonist or many, it can be realistic or highly fantastic, it can establish tightly controlled plots or loose streams of consciousness. Writers may deploy well-known practices of writing and provoking contingency through epistemic agency, but then end up with a narrative that is overly constructed and inert. They can draw on material agency to drive the process spontaneously but end up with incoherent waffle. Even the expertise of writers is no guarantee for a positive experience, as most writers I interviewed for the study underlined that they needed to reinvent their practice for each new creative project, that is, while they can draw on their general experience, the practice from a previous novel does not repeat immediately in the next. As Kiverstein et al. (2019) point out, in cases where precision estimates signal that prediction errors remain, or get reduced at a slower rate than expected, we experience frustration. Indeed, it may be argued that the anguish that many experience in creative projects (see Abraham 2019: 89) is to do exactly with how unstructured and random the problem space is, not furnishing the scaffoldings for a controlled prediction error reduction. The case I discuss here, the creative process of writing a novel, does not have the scaffolding of a “progress niche”. However, the very representations that are produced in writing can provide provisional scaffolding.

#### [Mise-en-abyme Modelling]

Literary texts very often duplicate their narrative structure or the process of their own making, for example, when narrators draw attention to the fact that they are telling a story or address readers, as when Charlotte Brontë’s narrator Jane Eyre says “Reader, I married him”, or when characters in a book read or write a different kind of text that in one way or another reflects on the main narrative, such as the essay “La première femme savante” in Brontë’s second novel *Shirley*. Such embedding are described as “mise-en-abyme” in literary studies (see Dällenbach 1977), and usually associated with postmodern playfulness. In Italo Calvino’s *If On A Winter’s Night a Traveller*, characters need to engage in a quest to find the next chapter or version of the story. In Chariton’s novel *Callirhoë*, written in the third century, the protagonists’ reflections at the end of a book (that is, a scroll in ancient copies) on what is likely to happen next, arguably marks a cliffhanger. I’ve chosen examples as eclectic as Calvino, Chariton and Brontë here to give the briefest of illustrations how common such “mises-en-abyme” are in literary texts, and to also illustrate some of the range from narrators addressing readers to representations of the writing process, the reading process on to the material properties of the format on which we read.

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How do such mises-en-abyme relate to writing? Let me give one key example: It is well known that as writers develop their characters, these characters begin to develop an agency of their own. Marjorie Taylor describes the phenomenon as the “illusion of independent agency” that also underlies imaginary companion in children and that is not uncommon among grown-ups (Taylor et al. 2003). Characters can figure as voices in an author’s mind (Foxwell et al. 2020), as conversation partners or even agents that demand a particular ending for themselves. Such “illusion of independent agency” appears to be linked to material agency in writing (see Bernini 2014: 356). Writers can for example engage in a session of automatic writing following the voice and the volition of the very character they have created. Arguably, this helps in exploring the perspective of a certain character on the events in the narrative. It can also help writers to construct their plots, by asking themselves “what would my protagonist do?” and then following their impulses while constructing the story. The author Lee Child, for example, reports this kind of procedure when he starts a new instalment of the “Jack Reacher” series and lets his protagonist drive the narrative (see Martin 2020). In the case of “Jack Reacher”, the author is very familiar with this character, because he has been writing him in a long-running series. However, the strategic use of the agency of characters can also be deployed in individual novels, for example, when a writer like Elsa Morante writes out poetry for one of her characters (Zanardo 2017). In each of these cases, the mental imagery of the character develops across a longer writing process and gets stabilised and externalised as it is written down in the representation of language. It becomes available not only as a momentary impulse in material agency, but also as a resource to work out how the narrative should develop (characters as “action proxies”) or to explore different perspectives on the events and the style in which they are written (characters as “consciousness proxies”). The written-out version of a fictional mind serves as scaffolding for the developing plot, character constellations and the fictional world.

“Mise-en-abyme modelling” is a process in which the writer’s generative model is temporarily extended into a developing probability design. The “generative model”, a term from predictive processing, can be defined as “structures instantiating an agent’s knowledge of sensorimotor contingencies” (Facchin 2021: 11618). These structures are not necessarily representations (see Facchin 2021 for this argument),<sup>4</sup> but they can be supplemented by representations, such as when readers supplement the sensory flow of the real world with the sensory flow from the text. The words on the page are representations that build a certain setting, for example, third-century Sicily in Chariton’s *Callirhoe*, characters, their actions and dialogues in readers’ minds. The generative model is supplemented by information about sensorimotor contingencies that derive not from readers’ immediate material surroundings but from representations of fictional surroundings that they access through embodied meaning-making processes. The probabilities of third-century Sicily become, for the duration of reading, part of the generative model of Chariton’s readers, even if contemporary readers will supply their own perspectives, for example on the role of the women, pirates or Gods.

Representations are a tricky concept in 4E approaches to cognition, since the focus on bodily action and our immediate relationship to the environment is strongly geared towards moving away from “images in the head” or the notion that everything needs to be processed in the head before it gets translated into actions and experiences. Literary texts *are* representations, however, and so representations need to find a place in a model for literary writing. A helpful take is provided by Giovanni Pezzulo and Cristiano Castelfranchi (2007). They argue that some modes of anticipation work without representation in sensorimotor perception, such as our sense of the sensorimotor contingencies in the world around us, while other modes of anticipation are “representation-based”

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<sup>4</sup> The debate around whether predictive processing and 4E cognition are compatible revolves (to a large extent) around the issue of representations (see Kerstens 2023 for an overview). Here, I take Clark’s (2016) position, namely, that they are compatible.

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(125). These representations retain “grounding and aboutness” and allow for processes of predictive inferencing that arise from manipulations of the representation. Pezzulo and Castelfranchi talk of “anticipatory capabilities” here, but Pezzulo (Pezzulo et al. 2016) would develop this in this predictive processing framework into the notion of “epistemic active inference” (that is, manipulating the representations to gain new knowledge). The generative model can temporally “detach” from the immediate environment and extend into the designed sensory flow of a representation (see Kukkonen 2023).

Let us go back to our example of writers deploying characters as action and consciousness proxies. The underlying “illusion of independent agency” refers to a process that can initially be non-representational. However, when such agency materialises as a particular “voice” in the head using language in a specific fashion, or when authors then begin writing down what these voices say and how they speak (see Foxwell et al. 2020), they develop representations. Else Morante renegotiates her generative model when she writes poetry as one of her characters, as she entertains “structures of an[other] agent’s knowledge of sensorimotor contingencies” embedded in and detached by the representation of the written text. Writers’ material and epistemic agency unfolds in the immediate material context they write in, where they can place words on a page and then manipulate them, but also in the written representations of fictional minds and storyworlds that they come to construct in the very act of writing.<sup>5</sup> In some instances, sensorimotor contingencies get doubled in the direct embodied encounter of handling pen and paper and in the represented encounter developing in the language. When Chariton ends a “book” in *Callirhoë*, it corresponded to the end of a scroll, and the break in the material substrate corresponds to a cliffhanger in the narrative and the character’s reflections.

What literary scholars call “form”, that is, the structural shape of a text, emerges at the threshold of grounding and detaching embodiment in representations. It is an indispensable element of the creative process that is by no means conceived beforehand but emerges from the material and epistemic agency of the writer when faced with materials of pen, paper and language. We can plot practices of creativity along a scale where the formal element depends more or less on the doubling of its materiality in representation:

1. playing around with the sensorimotor contingencies of the environment in improvisation and exploration (which combines material and epistemic agency); for example, a writer trying out different rhythms of typing on a keyboard
2. providing modular elements in the cognitive ecology that enable the manipulation of sensorimotor contingencies (which enables initial recursivity); for example, a writer using playing cards to stand in for elements of the narrative, shuffling them and rearranging them on a table
3. devising models to stabilise these manipulations in the cognitive ecology (which enables longer time horizons and a stronger element of epistemic agency); for example a writer drawing an outline of a building in which he can then house the chapters for his book
4. working through symbolic forms that enable agents to hold external factors stable and manipulate inner states, such as reading and writing (which enables, in turn, the mise-en-

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<sup>5</sup> Marco Bernini (2021) has suggested that Samuel Beckett pursues across his writings a “trajectory” to investigate different aspects of cognition by writing out “models”, for example, of the multiple voices that constitute his mental experience. The writers I present here do perhaps not have a clearly outlined programme of investigation; however, their use of elements of writing to embed models while writing underlines a much broader relevance for the creative process in literary writing itself.

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abyme models and running inferences by proxy); for example, a writer writing out part of the story as if in the voice of one of her characters

5. providing the necessary material support and recognition, as well as the protocols of an established field of creative practice, giving writers a ‘feel for the game’ (Bourdieu 1990); for example, writers participating in creative-writing workshops, positioning themselves in the literary market, and giving interviews

These levels underline that different methods are needed to trace the ways in which mise-en-abyme modelling can play out, as well as the different elements of existing work on creativity in 4E cognition that can be brought to bear on the cases to be analysed. To give two examples: Kimmel and Groth (2023) in their discussion of improvisation dance highlight the need to perceive “creative actionables” in a particular ecology, that is, the affordances that can be deployed in the spontaneous action of improvisation. Such “creative actionables” arguably link to the moments of insight due to accidents arising in the material environment that Ross and Vallée-Tourangeau (2021) describe as cases of “microserendipity” in creative processes that need to be observed through video-recordings of the ongoing flow of action. Such moments of micro-serendipity (which I might dub “productive contingency”) certainly play a role in writing too, and very often it can be traced on the material level of the manuscript whether the analysis can for example trace how the paper was handled or the letters on the page were manipulated (see also van Hulle 2022). Saarinen (2019) proposes that artworks provide scaffolding an affective “aesthetic resonance” for painters while they work. Wheeler (2018) presents cases where musicians draw on the affordances of a concert venue to devise a new style of music, or indeed, if they have the necessary cultural and financial capital, build their own music hall. Here, larger investigations of the technologies available for musical instruments, the social situations of artists and styles aesthetically valued and devalued would be crucial for the analysis. Research on other arts and other domains of creativity is compatible with the model I am outlining here. However, in the case of literary writing, the dynamics of material and represented sensorimotor contingencies is arguably particularly salient through mise-en-abyme modelling and also, as we shall see in a moment, through the recursivity it enhances.

#### [Recursivity in Literary Writing]

Written words on the page become available to manipulation in a way that spoken language it not (see Menary 2007; Freiman 2015). You can reorganise their sequence in a sentence, replace them or arrange in lists or word clouds, making use of the material properties of pen and paper (or, indeed, keyboard and screen). In spoken language, it would be much harder, because you adjust the overall deixis of the sentences as you produce the discourse in real time. As Oatley and Djikic (2008) point out, drawing on research into the cognitive effects of shifting from a predominantly oral to a predominantly written culture, writing contributes to an “externalisation” of thought that enables mid-way points in verbal expression between first-person and third-person positions, such as free indirect discourse or irony. Kafka’s manipulations of the personal pronouns, as well as changes in other manuscript stages, where he systematically deletes the inner voice of his protagonist “K” (see Harman 2002), are an example of the subtleness of externalisation. While such “doubleness” has also been observed for oral self-narrative (Goldie 2012) and non-fictional discourses, such as letter-writing (Fludernik 1993), it is most typical of fiction-writing in the narrative genre of the novel.

Writing not only affords rebalancing between internal and external perspectives through fine-grained manipulations, but also enriching an existing draft through revisions (see Freiman 2015). Lisa Zunshine (2022) analyses for example the manuscripts of Christa Wolf and traces how the author adds more levels of mentalising in every successive draft of her text. Zunshine starts from her hypothesis that literary texts work through multiple levels of embedded socio-cognitive complexity,

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such as “he knows that she wants him to stop suspecting her” (perhaps a minimal plot that entails four levels of embedding of mentalising; see Zunshine 2007 for the classical statement of this claim). She then looks at early drafts of one of Wolf’s novels and traces how situations get more complex as new levels of mentalising are added to the text. Already spoken language includes multiple levels of mentalising, but by adding new clauses into the sentences, in writing, arguably socio-cognitive complexity can be taken to levels of embedding not easily available in spoken discourse.

Such mentalising is also considered a “recursive” mode of human thinking by cognitive psychologists (Corballis 2011). Michael Corballis considers the human mind as recursive in the sense that complex thinking emerges from recursive embeddings, that is, embeddings where the next iteration is driven by the previous one, and where each iteration may be different from the previous one. He identifies social cognition (in the guise of “mentalising” or “theory of mind”), language and memory (in the guise of “mental time-travel”) as the key examples for how human cognition attains complexity through recursive embeddings. Memory, and connected elements of mind-wandering and dreaming (in the default-mode network), as well as social cognition have all been proposed as key cognitive processes in literary writing. Language makes such processes available to selective attention, metacognition and general manipulability (Lupyan and Clark 2015). In particular, literary forms, say for example a sonnet provide strong sets of affordances for directing attention to particular words and their sensorimotor contingencies through rhymes and metre (see Cave 2016 for this argument). The processes of attention and manipulation, then, depend further on writing and on a larger written tradition that provides a cognitive niche of different sonnet traditions (Petrarchan or Shakespearean), and intertextual references (see Kukkonen 2020).

These recursive embeddings, I would argue, are turbocharged in the process of creative writing. First, creative writing can draw on the repeated process of editing a text, stabilising it and destabilising it in turn. Such repeated engagement brings out the affordances of writing even more strongly. Second, creative writing uses mise-en-abyme modelling where the embeddings can drive variations and differences across levels, and where one embedding can contrast with the previous one. Consider the case of Morante writing poems for her character Davide Segre in *La Storia*. The poems that Morante writes are not included in the final novel, because they represent, in many respects, a failed take on the role of history in human life and hope that literature has for redeeming humanity (see Kukkonen forthcoming for an extended discussion). Morante arguably wrote the poems to work out what such a failed vision would look like and supplements it also with expositional statements by the character in the final book and in her manuscript. The character’s fictional mind, the form of the poetry (ranging from ottava rima to free-form poetry), and the contrast to Morante’s developing process of drafting the overall narrative, creates embedded levels of a particular take on the world, where each instalment drives the next one, and where the insights gained from each previous one feed into the next.

The recursions can stretch across sensorimotor contingencies of the material and the contingencies in the representation. Harman points out that the page number of the deposition that K reads corresponds to the chapter number in the manuscript for *Das Schloss* where he reads it and suggests that the embedded piece of writing lets us “eavesdrop on Kafka thinking aloud” (2002: 338). In Chariton’s novel, the narrative discourse draws attention to the layer of the material substrate and deploys it in pacing the narrative. We do not have any evidence of drafts for Chariton, so we can only speculate about the creative process behind these explicit statements of the narrators based on what is known how ancient writers used the scroll format (see Kukkonen 2024a). However, from the case of later serialised fiction, like Dumas’ *The Three Musketeers*, it is clear that the length of an instalment shapes the pacing of the narrative. The sensorimotor contingencies of the material and the

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sensorimotor contingencies of the representation feed into each other recursively, as literary form gains characteristic complexity from “mise-en-abyme modelling”.

Metanarrative statements (such as a narrator commenting on the end of the scroll) and metafictional representations of writing and reading situations can be seen as traces of the embeddings at play in the writing process. They can guide the critic’s attention to features to be analysed in the manuscripts, interviews and other means at hand to reconstruct the creative process (see Kukkonen 2024b). Many aspects of what is going on in the “coupled system” of the ongoing writing process are not available to verbal explication (Bernini 2014: 355). Writers, however, often do reflect in their chosen material of words on the writing process in interviews. They may even create “imaginary interviews” and construct clearly fictional scenarios of composition, as for example Anne Garréta in *La Décomposition*, where a narrator ostensibly uses an algorithm to select characters to be killed, based on the storyworld of Proust’s *In Search of Lost Time*, or as for example Cora Sandel’s author-character Alberte struggles with hand-writing, while another character types away with ease on a type-writer. Such “Schreibszenen” (see Campe 2021 for this term) are best read in contrast rather than in parallel with the manuscript evidence. Sandel, for example, shifts from hand-writing to type-writing early in the process of compositing the *Alberte* trilogy (see Kukkonen forthcoming for a detailed analysis of this case). Here, an analysis of the representation of writing and the cultural capital of different technologies in the field, from level 5 of our list, and feed into the analysis of the traces of sensorimotor contingencies of type-writing, from level 1 of our list. The descriptions of writing by hand and type-writing are not a record of how Sandel actually worked, but rather a means for thinking through what are the affordances of writing with different technologies and what this means for her particular project of novel-writing.

The importance of recursivity highlights a major challenge for writers, namely, how to bring the narrative to an ending. It is comparatively easy to generate new levels and variations. Here, form provides a decisive indicator. Form can refer to the ways in which the ending of a narrative coincides with the ending of a manuscript scroll, perhaps the revelation of a decisive plot event in the overall design, or indeed a compression of all previous levels into a single sentence, as in Calvino’s *If on a Winter’s Night a Traveller*, where the title of each embedded novel, presented in the table of contents (in Italian editions at the end of the book), turns into the first sentence of the actual novel when read out in sequence. Recognising such an organisation of the work produced through mise-en-abyme modelling and recursive processing can happen in the final phase of revision, or it can happen from one novel to the next. The recursive cycle of form, contingency and practice, in other words, can be used to describe the processes involved of the writing project of a single novel, but also for the different project developed across an author’s career.

#### [Conclusion]

The recursive nature of creative writing and its mise-en-abyme modelling underlines that the novel is a globally constructed “probability design”, that is, a form where writers’ practices provoke and manage contingencies across multiple levels. Such a complex probability design does not come about in a linear process, where writers first engage in “preparation”, then enter an “incubation phase”, gain “insight”, and finally pursue “evaluation” of that insight in writing a draft (see Wallas [1936] 2018), or where they first generate material and then edit it (see Flower and Hayes 1981). Even though it is acknowledged that stage models are limited in their applicability to expert writers (Flower and Hayes 1981; Oatley and Djikic 2008) and in only covering a short time horizon (see Finke et al. 1996; Abraham 2019: 66-67), stage models remain popular for thinking through the phases of creative processes (see Malinin 2016: 4 for an overview). When Laura Malinin (2016) proposes to map the 4E on different aspects on the creative process, she also starts from stage models. However, after

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discussion how in particular architects use the affordances of the environment, she arrives at the conclusion that “stage models do not capture the iterative, physically situated nature of incremental breakthrough” (16).

I have approached the creative process not from a stage model, but from observations of what writers do, and this has led me to propose a recursive rather than a linear model. At any point in the process, writers might decide to move into detailed editing of the form, rethink their overall practice or provoke contingency. This appears especially salient for literary writing that extends over long temporal horizons, where writers can embed different aspects of the writing process in mise-en-abyme structures of fictional minds and invented texts. I propose to analyse the process of creative writing as a constellation of form, practice and contingency, where writers deploy contingency in their practice, taken as expertise in balancing material and epistemic agency, as well as in the forms they design, and where writers usually feel the need to invent a new practice for writing for each new form they intend to generate. The model suggested here, then, introduces mise-en-abyme modelling as a way of scaffolding the creative process that enables a dynamics between material and representational aspects of sensorimotor contingencies and can develop into recursive cycles. The model draws on the particularities of literary writing, but also foregrounds the traces of everyday contingencies in the literary work of art that, often enough, serves as a reminder of the inscrutable contingencies in our lifeworlds.

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