Creative Contingencies: Predictive Processing, 4E Cognition and the Case of the Novel

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Abstract

Things do not have to be the way they are, and this article argues that creativity can be usefully understood as an exploration of such contingency. It draws on empirical evidence from novelists’ processes and projects in order to develop a theoretical approach to creativity through novelists’ particular awareness of contingency and their readiness to manipulate it with their practices and then integrating it into literary form. The key role of contingency for understanding creativity is discussed in relation to recent attempts to capture creativity in the predictive-processing framework and in relation to notions of sensorimotor contingency in contexts of embodied, enactive, extended and embedded cognition. The specificity of the novel as a creative project lies in its particularly ill-defined problem space and a long-term dynamics of open-ended interactions in embodied contexts. From a discussion of these features emerges a sharpened understanding of recursivity and embedded modelling in creativity. In the final section, I use the complex case of the novel as the basis for proposing a model of creativity across contexts in the lifeworld.

Keywords

Creativity; Literature; Novel: Predictive Processing; Sensorimotor Contingencies

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**Creative Contingencies: Predictive Processing, 4E Cognition and the Case of the Novel**

**[Introduction]**

Creativity has turned into a social imperative. We are all invited to express our “creativity”, solve problems in a “creative” manner or collaborate in “creative” brainstorming in the most mundane of contexts. Sociologist Andreas Reckwitz (2012) argues that such a social imperative comes from the high value that the twenty-first century places on “newness” and “originality”, transferring the notion of “creativity” from artistic and literary fields into all social spheres. That generalisation is also reflected in current psychology and philosophy. 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. In fact, all three approaches share the assumption that creativity is domain-general. However, such a domain-general approach has been challenged recently in neurosciences and cognitive sciences. High scores on standard test in creativity (such as the Torrance text) in the modality of verbal expression does not equal high scores in the modality of (mental) imagery (Baer 2022). It has been suggested instead that a new approach, starting from specific domains and contexts in which creativity plays out, has to be developed (Abraham 2022).

Indeed, it may be necessary to consider creativity once more from the domain of literature to get a better grip on it conceptually. In this article, I propose such an approach. I take the specific case of creative writing in novelists in order to develop a more generalisable model for thinking about creativity and its place in our lifeworlds. My argument builds on a long-term research project, interviewing novelists and analysing manuscripts from a wide range of different linguistic and cultural backgrounds to understand what it is that authors do.[[1]](#footnote-1)

The investigation progresses in a bottom-up fashion, analysing the practices of writers in concrete contexts. It traces creative careers on a time-scale that is larger than an experimental approach, generally only recording a single session of creative work, but that is at the same time more specifically trained on authors’ projects and processes than developmental studies of artistic cohorts. What emerges is a particular awareness of contingency in novelists and their readiness to manipulate contingency with their practices and then integrating it into literary form. In the first section of this article, I shall make an argument for the key role of contingency in understanding creativity and relate this argument to recent attempts to capture creativity in the theoretical framework of predictive processing. Then, in the second section, I place this sharpened notion of contingency into the contexts of embodied, enactive, extended and embedded cognition. The third section will highlight the specificity of the novel as a creative project that has a particularly ill-defined problem space and a particularly long-term dynamics of open-ended interactions in embodied contexts. The discussion will then lead me to posit recursivity (section 4) and mise-en-abyme modelling (section 5) as the distinguishing features of the novel as a creative project, before I then use the complex case of the novel as the basis for proposing a model for creativity across contexts of the lifeworld in the final section.

**[Contingency and Creativity]**

In 2019, the Norwegian journal *Samtiden* asked ten authors about how literature can “walk new paths” in the next decade. Gunnhild Øyehaug responded:

The answer lies with literature. I have tried calling him and asking, but he only looked at me, through the FaceTime window, were he stood, in the midst of society, world and time, just as silent and closed in on himself as the sphinx at Thebes. (*Samtiden* 3/2019, p. 94)[[2]](#footnote-2)

The phrasing of the question “how literature can walk new paths” can be considered as contingent in the sense that the proposition could have been expressed differently: “how literature will develop” or “what new directions literary writing will take” would be close equivalents. In most contexts, speakers are not aware that semantic choices are just so – contingent. Øyehaug, however, realises the contingent potential of the question when she turns literature into an anthropomorphic figure whom she can call online.

We can analyse her answer in the framework of predictive processing (see Clark 2016; Hohwy 2014 for two fundamental accounts of predictive processing). The approach suggests that cognition works on the basis of predictions that can be confirmed (or not) in our encounter with the world. Consider the case of reading a text. Here, linguistic conventions will provide strong predictions to structure our comprehension of other speakers and writers. Much of what I write here works (hopefully), because you can already predict the next couple of words in the sentence, because you master syntactic sequences, idiomatic phrases and semantic collocations in English. Your predictions have relatively tight parameters (or “precisions”) of where productive new information is likely to arise, and hence you have a sense whether surprising phrases (or “prediction errors”) are likely to be worth paying attention to. Øyehaug provides readers with a substantial prediction error that is likely to change readers’ perception of the question itself (or “precision expectations”) throwing into relief that literature refuses to be captured by standardised questionnaires.

How can we then model what Øyehaug does? Predictive processing would formulate it thus: Øyehaug arguably does not perceive the range of possible predictions about how to comprehend “literature walk[ing] new paths” with the same narrow “precision” as we would in an everyday context. “Precision” can be defined as the “inverse” of how variable the information is that we have (see Hohwy 2014, ch.3). The higher the precision, the less variable and the more predictable the world appears. Precision provides a second-order assessment of prediction errors, focussing the range across which possibilities are weighted as more or less probable. The higher the precision we assign to a prediction error, the more likely it is to provide a significantly more reliable grasp of the probability distribution in the world around us. If precision is stable, we know what to pay attention to and, if we are in doubt about the reliability of precision, we can play around with the environment to sample its responsiveness in “epistemic active inferences” (Pezzulo et al. 2016) in order ascertain the best probabilities. A standard account of predictive processing favours a narrow setting for precision so that we get a progressively better grasp of the regularities of the world.

For Øyehaug, however, the precision for where to look for “literature” is more capacious. Possibilities are not locked into a particular probability distribution, but more flexibly configured. She perceives, in other words, the “contingency” of thinking of literature as an abstraction of printed, literary output, as the question implies and comes to develop her own alternative, creative take by strengthening another possibility. Øyehaug, and other literary authors, have a heightened perception of the contingency of the lifeworld around them and of the contingencies of language, understanding that things could always happen otherwise and ready for turning this perception into a full-blown imagined literary artefact.[[3]](#footnote-3)

Constant, Clark and Friston (2023) have modeled creative exploration for the predictive processing framework. They investigate what they call the “enlightened room problem”, namely, “how can a predictive system seek out anything that is truly ‘different from what it already knows’ “ (p. 2). The article reports a number of computer simulations, whose results suggest that even for systems that work under the imperative of error-minimisation, creativity is possible. They distinguish between cases where there are “perturbations in an agent’s model of the structure of the world and variations in environmental contingencies” (p. 9). My analysis of Øyehaug’s creative manipulation of the interview questions suggests these go together. Here, the contingencies of the environment, rather than getting minimised through a narrow precision setting, are maximised through a looser precision setting. The generative model can emerge from an alternative set of possibilities and shape it into probabilities. The “generative model” refers to the ways in which an agent’s predictions, precisions and precision expectations are configured, that is, the feedback loop through which they run their inferences about the environment. Note, however, that the new image creates a complete alternative “generative model” where literature (much like Øyehaug herself, actually) remains stubbornly silent and mysterious as to its future development.

Margaret Boden’s classical definition of creativity draws on the product of the creative process, but she also offers a distinction between three types of processes that yield such creative products in *The Creative Mind* (2004): combinatory creativity, exploratory creativity and transformative creativity. In combinatory creativity, existing elements are combined in novel ways. Boden gives metaphors or scientific analogies as an example. Here, a concrete domain and a conceptual domain are brought together to generate new insights (such as “the heart as a pump”). In exploratory creativity, Boden’s second mode of creativity, a particular corner of the problem space is scoped for its regularities and new constellations are revealed in this manner. Finally, in transformative creativity, the problem space itself is changed as a result of the creative intervention. Boden understands this as commensurate with a change in the artistic field, for example, when a new artwork changes what it means to paint in an artistic manner. Boden’s conceptualisation of creative processes as playing out in a problem space that offers a clear structure (in exploratory creativity) or a structure yet to be discovered (in transformative creativity) goes in principle together well with predictive processing as a model of cognition where the probabilistic regularities of our environment are predicted (in perceptual inference) or discovered (in active inference). Indeed, Constant, Clark and Friston draw on Boden’s definition.

What Øyehaug does here, however, complicates Boden’s distinction between exploratory and transformative creativity. She perceives the contingencies in the possibility space of the interview and produces an alternative probability design for navigating them. Is she exploring a given space of “conceptual structures” as in Boden’s exploratory creativity? Her move certainly has a more transformative feel to it, even though literature as the sphinx on FaceTime clearly does not reach the heights of H-creative achievements like Mozart’s operas that Boden links tightly to transformative creativity (see Boden 2004, pp. 233-234). Øyehaug clearly remains within the general framework of the interview, and writers’ subverting interview questions for creative purposes are not unusual as a survey of authors interviews from the *Paris Review* can illustrate. However, at the same time, Øyehaug also transforms the probability distributions of the interview framework. The problem here lies in Boden’s conception of the “conceptual structures” in terms of “possibilities” rather than “probabilities”. If we look at this from the point of view of the predictive processing framework, then possibilities appear to be given, but they can only be perceived through the predictively weighted probability distributions that shape our minds. Probabilities can dynamically change in perception, and they are likely to do so through the prediction errors that emerge in the exploration of the lifeworld. Explorative creativity can take that exploration into areas that provide new prediction errors and therefore, eventually, transform the generative model. Transformative creativity will change the generative model more suddenly by drawing attention to contingencies and by sampling contingent responses in the environment.

**[4E Cognition and its Contingencies]**

An embodied perspective brings these contingencies more clearly into view. As the enactive account suggests, we perceive the world as perceptually rich, thanks to our skill in mastering the sensorimotor contingencies of the world and how these contingencies would change in response to our movements (O’Regan and Noë 2001). Predictive processing, as I understand it, is compatible with an account of embodied cognition as the skillful exploration of the world and its sensorimotor contingencies. We perceive objects in three dimensions because we know how their impression on our retina is likely to change if we reached out and turned them around. Predictive processing embedds that sense of contingencies in a larger model of perception and action through feedback loops in the generative model that link multiple modalities together, while also suppressing the feedback from some modalities (Clark 2016; Blakemore, Wolpert, and Frith 2000). As we move through the world, the generative model navigates its sensorimotor contingencies skillfully, working towards a reduction of prediction errors – and thereby a reduction of the awareness of these sensorimotor contingencies.

Indeed, as David Kirsh’s (1995) “The Intelligent Use of Space” suggests, we often make use of spatial arrangements in order to minimise contingencies in our sequence of actions. Bartenders use the shape of different glasses in order to streamline the sequence of the drinks they are going to mix. Cooks mark the piece of butter they have measured by placing a knife next to it, so that they eliminate the moment of choice when to pick the right piece. Tetris players rotate the bricks while these fall, so as to play through the multiple possible orientations of the geometrical structures, outsourcing the mental strain of rotation onto the physical environment. In each of these examples, agents use spatial arrangement to pre-structure their perception of the environment and limit contingencies. The contingencies described by Kirsh go beyond the sensorimotor contingencies that O’Regan and Noë refer to, because they extend along complex chains of actions in the environment where agents physically interact with it and manipulate it. Here, the mind is extended into the physical environment and cogntive processes other than perception come to be streamlined through the control of contingencies.

Already Kirsh’s Tetris example indicates that contingencies also play an active part in the creative process. Mental rotation, and its elusive sensorimotor contingencies, gets transferred onto the physical rotation of the bricks as they fall on the screen, and their more concrete sensorimotor contingencies. At the same time, however, the dynamics of the Tetris game constantly increases the challenge for players through less and less predictable patterns of bricks as the game progresses. Contingency is minimised and then increased again in the course of game play. Play has been modelled for predictive processing as a process where players engage in inferences with a particularly well-calibrated “reduction rate” of prediction errors, so that engaging in play feels good, stimulating curiosity, while providing surprising encounters (Andersen et al. 2023). The reduction rate of prediction errors also refers to the process in which precision is specified (Kiverstein, Miller, and Rietveld 2019), suggesting that also in game-play reconfiguring precision has an important role to play. For the reduction rate to work as a positive emotional experience, however, the information from the environment needs to be carefully scaffolded so as to modulate precision within a certain range. In game-play, rules and props provide such designed features of the environment. Constant, Clark and Friston (2023) refer to the same research literature at the end of the article, when they suggest art as an “exploratory bubble” in a larger distributed-cognition setting. In the creative process, however, arguably much agony arises from the fact that such scaffolding is not readily available.

Creative agents can make active use of the contingencies of the environment. Michael Wheeler (2018) proposes to think of creativity as something that depends profoundly on our embedding in cognitive niches. Wheeler discusses the case of music, with The Talking Heads adjusting the sound of the songs to the accoutics of the venues which they played, with Brian Eno exploiting a design flaw in instruments to compose new music, and Wagner constructing the Bayreuth Opera House with a larger orchestra pit to have more space for brass instruments that will supply a more bombastic sound. Creative minds are embedded in their own cognitive niches, and in many situations, also construct new scaffolding within them. Wheeler’s argument can also be applied to the case of literature. The clearest case would be furnished by analyses of writers’ manuscripts where the affordances of writing on a type-writer (at greater speed) may contribute to new modes of compositing (for example, moving into more automatic writing), or where little paper slips of dialogue can be reconfigured in a puzzle-like aleatory writing process before the text is written out in fair copy (see Kukkonen 2019 for a discussion of this practice in the writing of Frances Burney). However, also Øyehaug’s response is situated in the larger cognitive sphere of the author interview with its scaffolding of question and answer, and recognised models for self-fashioning of the author (see Atkinson and Silverman 1997).

Musicians and writers arguably engage in what Lambros Malafouris (2008) calls “material agency”, where an agent’s intervention in the physical world cannot be reduced to their intention to act upon the material, and where producing an artefact cannot be simply understood as imposing an abstract (mentally conceived) form on the material. Marco Bernini (2014) suggests that this is also the case in literary writing. Instead, the materiality of the clay (in the case of the potter who is the exemplary case for Malafouris) interacts with the hands of the potter and the wheel. Material agency cannot be parsed into active agent and passive material, but rather emerges from their encounter as the potter sits at the wheel, and the pot itself comes about in the interaction between the potter and the clay, rather than merely realise a formal design. Material agency refers to an important dimension of the creative process, namely, that the final state is often not present in the mind of the creative agent from the beginning. Creative agents need to play around with contingencies in the environment in order to come towards the final configuration of a piece of music or a novel.

Arne Dietrich (2015) argues for two sets of brain processes underwriting creativity. Creative agents can engage in largely sighted, deliberate cognitive processes, running through every imaginable constellation in the problem space, drawing on the affordances of their executive network in the brain. They can also engage in largely blind, spontaneous cognitive processes, throwing “search beacons” into the possibility space and running simulations of how the manipulation may play out, drawing on the affordances of the default mode network. There is no single area of the brain devoted to creativity, nor is there a single cognitive process or personality trait that encompass it. Creative cognition draws on cognitive processes across a number of brain areas. These two modes of creativity go together, yielding a flexible mode of moving through the problem space in a “partially sighted” fashion. Debates around the relative blindness and sightedness of creative activities have partly been unfolded around the multiple versions of Picasso’s sketches and outlines for his painting *Guérnica* (Arnheim 2006; Simonton 2011; Damian and Simonton 2011; Doyle 2008). While some argue for largely “sighted” and controlled moves from one variant to the next, others foreground the “blind” leaps where Picasso suddenly proposes new compositions that have no preliminarys steps in the earlier sketches. Dietrich’s neurological evidence suggests that deliberate and spontaneous modes of cognition need to go hand in hand in creativity. Picasso proceded both in “blind” and in “sighted” manners. Deliberate and spontanenous modes of cognition clearly can be related to the playing around with contingency that we observed in Øyehaug’s interview answer.

Material agency entails a shared agency between the predictive models of the writer and the constraints and properties of the environment, its practices and the affordances of form. It is tied to the coupled system while the creative process is ongoing. At the same time, however, creative agents are not entirely “blind”. As Dietrich suggests, deliberate modes of cognition can come into play, as creative agents consciously explore particular areas of the possibility space. Epistemic agency offers a complement to material agency here. Also epistemic agency is deeply engrained in the cognitive niche, but it refers to the mental autonomy of the agent from the ongoing creative process (see Fabry 2018). Such mental autonomy is minimally expressed in “veto control” (Metzinger 2015), namely, the control to stop what it is that you are doing. It depends on what Regina Fabry characterises as a mode of “meta-awareness”, where the individual retains degrees of attentional agency, that is, the ability to focus attention, and cognitive agency, that is, the ability to control thought (see Fabry 2018, p. 2). The potter, in other words, can decide on strategies that she deploys while shaping the clay in order to give it a different shape or respond to particular contingencies in the process. Indeed, she may also try out new strategies in order to explore how a new kind of pot could be thrown. When we consider processes that are described as “creative”, it appears to be the case that material agency and epistemic agency need to be combined. Material agency and epistemic agency go together in writing in a creative mode, because agents draw on processes driven by the material that they master and which gives them access to spontaneous cognition, but because they also draw on processes driven by their meta-awareness and (minimal) control over what it is they do and which gives them access to deliberate cognition.

The combination between material and epistemic agency does not lead us back to the primacy of the intention of the agent and to the imposition of a pre-conceived form on the material that Malafouris wants to get away from. Rather, it promises to account for how experts in productive practices bring their expertise to bear and how they develop their practices in creative modes. Expertise in embodied skills has been understood as a process where spontaneous, entrained aspects of these skills are complemented by more deliberate modes, adjusting how these skills are deployed in response to the contingencies of the environment (Sutton et al. 2011; Bicknell and Sutton 2020). In the on-going performance of the skill, in other words, spontaneous and deliberate aspects of the skill lean onto one another in different proportions. “Skill in writing a novel”, however, is difficult to define for at least three reasons: (1) Multiple embodied skills contribute to writing, from holding a pen to conceptualising plot sequences; (2) “a novel” is not a problem to be solved; (3) novelists continually aim to reinvent their forms and practices, so that their “skill” looks different across their career.

**[The Problem Space of the Novel]**

When literary writers decide to try their hand at a novel, they are faced with an open problem space. The novel is notoriously hard to define: it is longer than a short story, but it is not clear by how much; it tends to give an inside view of the mind of a protagonist, or several protagonists, but it does not have to; it tends to be set in a realistic version of our world, but it does not have to be; its action can span a day or a hundred years. While certain genres and models exist to provide some orientation what the novel has been, it does by no means limit what a novel could be. The challenge for writing a novel lies in defining the problem space anew for every text. Creativity for a novelist then is not limited to a known problem-space. Novels in general, and not only those who will eventually transform the literary field, need to go beyond the explorative mode of creativity. The creativity required for writing a novel is “transformative” in the sense that writers need to find their own constellation of characters, temporal and narrative structures. They need to invent the form anew with every novel they write.

Writers clearly engage in deliberate search strategies in the problem space, such as planning out chapter sequences, and they also engage in spontaneous search strategies, such as simulating a characters’ thoughts. However, the combination of these modes, as they emerge from Dietrich’s account, is not enough to specify how these writers then explore the problem space of the novel. It appears that the templates of skill, combining both modes, are not directly learnt in creativity. Enculturation gets writers only so far. Their expertise lies not in particular skills that are usually trained, even though they may master (some of) these skills, such as type-writing, argumentative writing, producing fluid prose, etc. These skills arguably underwrite creative expertise, but they are not its core constituent. The writer’s expertise lies in devising a new probability design.

I suggest that the novel is a useful case study for developing a model for creativity, because it compounds the issues around creativity that I highlighted in the previous sections and because its study offers a precise way to address these theoretical challenges.

Novels provide a “probability design” for readers to go through (see Kukkonen 2020). The words on the page cohere into a designed sensory flow, where readers’ can revise their sense of what is likely in dialogue with the plot events. Plot events work as designed prediction errors that place readers’ inferences on a trajectory towards the conclusion of the narrative. The perspective from which the narrative is told, word choices, rhythm in the prose, etc. then contribute to calibrate readers’ sense of how reliable the prediction errors are. If we learn about a plot event from a narrator who is highly unreliable, we may hesitate to put too much weight on the information when projecting what is likely to happen further on in the narrative. Especially when re-reading, readers may choose to pay attention to different details on this level of how the language of the text is shaped, and thereby develop a different response to the novel. Even though the plot events do not change, your perspective of *Anna Karenina* will change considerably if you start paying attention to Karenin, the betrayed husband, when you read the novel for a second time. Literary texts have a particularly loose probability design when compared with expository texts, which enables multiple configurations of precision for readers. This makes the novel more exciting and rewarding as a re-read. It also makes it a good deal harder to account for the process through which writers create the probability design of a novel rather than the probability design of an expository text.

Writers produce a novel over a long period of time, often years. They write, revise, re-write and start again, as they work their way towards a probability design that is stable enough to be identifiable as a narrative, while at the same time flexible to enable readers to run their own explorative inferencing while reading. Even though the entire text is written and fixed at the time when readers engage with it, the novel offers a loose enough design of narrative, style and genre, so that readings can remain contingent. The long time horizon is necessary here, because it arguably enables writers to enrich the text through multiple reiterations, and to modify its balance between the specificity of prediction errors and the looseness of its precisions. It poses a problem for traditional accounts of creativity, however, because these mostly account for a single session of engagement or else developmental factors of artistic environments, not for the continued engagement with the same probability design. This is where the agony comes in. What might look like a successful solution at one moment in the creative process, may get discarded two weeks later, and then find it way again into the probability design in a modified form some months later. The time lines are often difficult to reconstruct, as the study of manuscripts demonstrates (see Van Hulle 2022; Gresillon 2016), and not always accessible to writers’ conscious awareness or even planning. The problem space that writers explore while writing a novel gets itself reshaped and reconfigured with every engagement.

The novel then presents a case study for creativity that (1) draws on both sensorimotor contingencies in the material engagement with pen, paper and writing technologies and the contingencies designed in the form of the probability design, (2) entails multiple combinations of material and epistemic agency as it unfolds over a long time horizon and multiple reiterations; and (3) requires “transformative creativity” on a regular basis.

**[Recursive, Not Linear]**

The writing process is traditionally defined as linear, moving from idea generation to transcribing and reviewing the text that has been produced. However, the traditional “generate” ideas and “evaluate” them does not work well for the complex mess of processes that go into writing a novel, because what constitutes a solution is so ill-defined. While both psychological process models for writing (Flower and Hayes 1981) and description of the genetic dossier in manuscript studies (Van Hulle 2022) underline the need to consider loops in the process, they nevertheless tend to stick to an overall linear timeline in conceptualising it. Writers, however, may use practices to provoke an awareness of contingency at the beginning of their writing process, for example, when Georges Perec designs a sequence of constraints to write *Life. A User’s Manual* (Perec 1993). Such a writing practice works towards greater contingency, (literally) re-writing the rule book for the particular novel they are going to produce by defining the parameters of the possibility space. Yet writers can also move the other way, choosing a contingent environment to work with, such as drawing on archival research to provide the material for their next novel, and then devising a new practice to manage that contingency. Marina Warner’s *Inventory of a Life Mislaid* (Warner [2021] 2022) or Camille Laurens’ *Little Dancer Aged Fourteen* (Laurens [2017] 2018) would be an example of this approach. Here, active inferences are deployed to reveal the precisions and to build a sense of precision expectations that structures the possibility space anew. Writers can move from practice to contingency or from contingency to practice, and, depending on the individual creative process, they may move in both directions at different points in the long-term project of writing a novel.

Practices provide constraints here to either make possibility space more open or to manage an open possibility space productively. However, not only practices provide such constraints. The form of the literary text, its probability design, also relates itself to the possibility space. Writers can use alternative forms as a “second track” in the creative process, thereby keeping contingency open, or they can decide to include a designed flaw, that is, a prediction error that does not yield a stable inference, in their probability designs. Perec, for example, maps out a ten-by-ten grid of “areas” *Life. A User’s Manual*, but then the novel, progressing along the supplementary rule of the knight’s move from one area to another, chapter by chapter, only narrates 99 out of 100 possible chapters (see Duncan 2019 for a more general contextualisation of Perec's practices). Such formal interventions leave precision less defined and prevent authors from settling on the design of a particular prediction error too quickly. Or, indeed, keep it open even in the final text. More traditionally, though, form is understood as a limitation on contingency and it certainly also serves that function, for example, when the plot of a narrative provides a trajectory towards the end and generates the (illusion of a) necessary sequence of events. Prediction errors yield steadily more reliable information about the probabilities of the fictional world. Aristotle has provided the classical formulations when he wrote in the *Poetics* that literature provides account of events as they “should have happened”, while history needs to stick to events as they actually have happened. However, tightening or loosening precision are both possible through the calibration of form and contingency. Again, the same writer can deploy form in multiple ways while writing.

We can therefore distinguish between form-related constraints and practice-related constraints. Form-related constraints apply to the probability design itself and how authors manipulate that linguistic and conceptual structure under the creative process, while practice-related constraints refer to the embodied actions of writers, the protocols of enculturation and the cognitive niche of technologies and material affordances into which these actions are embedded. It is important to keep in mind that I understand form here are something that emerges in the creative process. During the creative process, form is always in-the-making, not (necessarily) accessible to writer’s intention and becomes fully graspable as a probability design only when the writing process is concluded.[[4]](#footnote-4)

There is also a movement between form and practice. Writers can deploy practices in order to develop forms. For example, writers can use type-writing to generate particularly fast-flowing prose. The ways in which the material practice deals with active inferences transfers into structures leaving room for the epistemic active inferences of readers in the probability design of the final text. In turn, form can be used to inspire new practices, for example, when writers have spent a lot of time inhabiting the form of a particular book as readers and then translate these forms into their own practices, such as a poet who translates the form of rhyme into the means to organise a prose narrative through mirroring structures between different stories. Here, the epistemic inferences modelled by the literary form of rhymes turn into active inferences in the creative practice. The probability design and the creative ecology within which it is embedded can translate from one to the other. Indeed, literary texts usually deploy some kind of mise-en-abyme or metafictional comments where such translation processes remain present in the probability design and offer readers the option to adjust precision flexibly and engage in epistemic active inferences while reading.

We arrive at a model of creativity for literary writing where practice can move towards contingency, and vice versa, where form can give space to contingency, and vice versa, and where form and practice similarly translate into one another. It is a descriptive model providing the means to analyse the creative process of writing without prescribing a particular linear sequence, as writers can move back and forth between these elements across the multiple sessions of writing they engage in.

The possibility space can be modelled across different writing projects that then feed into other texts. Writers may, for example, expend much epistemic agency in writing a particular piece. Here, writers lay down the outlines of the possibility space relatively clearly, but often such consiously designed projects where authors may even formulate a clear goal state about what they want to write tend to fail as novels, because they lack spontaneity. Italo Calvino, for example, struggled to write a second novel reaching his declared goal state of a realist fiction for many years and across multiple different texts. When he then chose to pursue a more fantastic approach where also impossible events can reflect deeper truths with *The Baron in the Trees* (1957), he managed to write the novel itself within three months (see my account of this process in Kukkonen under review). After the work of the epistemic agency had been done with other texts, he could now lean on material agency and let the generative models do their work spontaneously. Recursivity extends across writing projects. I propose to consider also their career as a recursive process, where akin to Dennett’s “multiple drafts model of the self” (1993), individual texts emerge and stabilise at various moments in their engagement with the world, their awareness of its contingencies and their innovative combinations of epistemic and material agency.[[5]](#footnote-5) In these moments, a “draft” is published as a novel, but the overall process of the writer’s activity continues to the next text across the entire career of the writer.

**[Mise-en-Abyme Modelling]**

Literary texts often represent the process of their own making. Narrators can draw attention to the convention that they are “telling” a story (think of Jane Eyre’s famous “Reader, I married him” in Charlotte Brontë’s novel). Such metafictional references can sometimes also take the guise of an imagined text that is embedded in the main text in what literary studies calls “mise-en-abyme”, for example, when the protagonist works on a novel herself, to which readers do not gain direct access. I propose to call such phenomena “phantom texts”, in parallel to “phantom limbs”, because their present absence affects the ways in which readers get to model the overall configuration of the possibility space.[[6]](#footnote-6) The novel itself includes a text that does not exist but that its protagonists talk about and work with. While “phantom texts” are a striking example, something similar also applies to to self-conscious narrators and the (exisiting) literary texts that novels refer to but do not explicitly reproduce. Here, writers engage in an interesting combination of epistemic and material agency. They choose to posit a mise-en-abyme, that is, an embedded text in the text that they are actually writing, in a move in epistemic agency. Then, that text gets either drafted or imagined in a move in material agency. Here, authors design an embedded generative model that they can then use to generate spontaneous inferences for a second level text that mirrors or reflects on the main text and provides space for alternative inferences.

The boundary between the embedded text and the main text can be understood through the concept of the Markov blanket in the context of predictive processing. Markov blankets (Kirchhoff and Kiverstein 2021; Clark 2017) provide the interface between what is the “inner state” of an organism and its “outer states”. Self-evidencing organisms understand who they are through the shifting interface between what belongs to their existing state, which, given the extended-mind hypothesis, may include elements of the environment. Otto’s notebook, from the classical thought experiment by Clark and Chalmers (1998), becomes part of his “self-evidencing” series of inferences when he needs to remember something, and thereby, the notebook gets included in the inner states with a Markov blanket drawn around it. Clark (2017) suggests that such Markov blankets can be multiple in any given system, and deployed depending on the need of the organism in response to its environment. Kirchhoff and Kiverstein limit Markov blankets to one blanket at a time that gets set by the organism through what they describe as “action policies” (2021, p. 4807). I propose to think of the epistemic agency of an author in terms of selecting a phantom text or an intertextual reference in a mise-en-abyme as an “action policy”.

The embedded generative model is not necessarily tied to an imagined text, as self-conscious narrators like Jane Eyre suggest. It is a well-known phenomenon that writers experience the presence and volition of characters in the writing process. These characters often desire their happy ending or tell writers how they should write the story by providing something close to “dictation” to writers. Psychology has conceptualised the phenomenon in terms of the “Illusion of Independent Agency” (Taylor, Hodges, and Kohányi 2003), which also underlies the phenomenon of “imaginary companions” in children. Indeed, it appears that writers are more likely to have imaginary companions as children and that they are more prone to the “illusion of independent agency” as adults. More current research on how writers use characters and the voices they hear has confirmed this phenomenon (Fernyhough et al. 2019).

What seems to be happening here in terms of predictive processing is that writers have an imaginary generative model for the characters which runs independently of their own generative model while writing, while both of them are enclosed by a Markov blanket. The generative model for a character can be run through material agency and work almost spontaneously, hence authors do not experience a sense of “control” or epistemic agency over the imaginary companions who tell them what ending to their narrative they desire. Characters in general can work as “consciousness proxies” (Kukkonen 2023), providing embedded generative models against which readers can measure their own self-evidencing inferences. Writers can use the embedded generative models of characters as “consciousness proxies”, when trying out how a character and/or narrator would experience the world, or as “action proxies”, when attempting to devise the next step in a narrative. Again, an element of epistemic agency is maintained, because author decide how to use the embedded generative model in the eventual written text.

Language and writing are means to extend cognition, because language as a symbolic form abstracts from experience (Clark 1998). It can therefore scaffold thought and be used to direct attention (or precision) in perceptual inferences (Lupyan and Clark 2015). In writing, language can supplement memory by giving us the possibility to outsource what we need to remember on the material substrate or it can supplement the ways in which we manipulate arguments and linguistic features, because we can revise with greater percision and comprehensiveness on the written text (Menary 2007). Writing a draft where these embedded generative models are encoded, enables authors to stabilise these elusive mental phenomena and revisit these characters and phantom texts over a long time span, letting them run wild through material agency and exploring the possibility space almost freely, or choosing them to deliberately to explore part of the possibility space through epistemic agency.

Literary texts, then, enable a particular mode of writing. Writers can not only explore the possibility space and write down their inferences. Instead, they can model the possibility space throughout the writing process with multiple possible generative models. These multiple generative models unfold their full potential only over the long-term engagement that it is to write a novel, because only over a longer time frame the multiple reiterations of a particular combination of material and epistemic agency can come into its own. Mise-en-abyme modelling includes generative models both for characters (through the illusion of independent agency) and for other texts (through phantom texts). The written form enables authors to hold a generative model where they can lean on material agency and a generative model where they can lean on epistemic agency.

**[Creativity Across Contexts]**

In her interview answer, Øyehaug performs in miniature the recursive process of literary creativity with an embedded generative model. “Literature” becomes a mysterious anthropomorphic presence on FaceTime. In the novel, creativity unfolds in a setting whether the written language enables multiple embedded generative models, so that authors can maintain multiple different precision settings at the same time and explore their implications. The form of the literary text is crucial here for the novel. Does this prevent the model for creativity from translating into other kinds of practices beyond the case of the novel? Not necessarily, as the case of Øyehaug’s interview answer suggests. “Form” refers to the probability design of a literary text in this particular case. However, since probability designs entail a “designed sensory flow”, where prediction errors, precisions and precision expectations are modelled, they arguably do not only apply to written texts. The designer environments of the cognitive niche provide similarly “designed sensory flow” (Kukkonen 2022). In current literary studies, these are called “social forms” (Levine 2015), but such an understanding of the regularities of the environment as designed through human shaping can be also aligned with 4E accounts.

Forms are overall configurations through which cognitive inferences can be run. Social forms and designer environments are configurations in physical space or in a representational space (such as language) that provide pre-designed prediction errors and that can be changed through active inferences and epistemic active inferences. Their creative potential lies in the degree to which they are available to actions that provoke contingency or that deploy contingency in order to create new configurations. In so far as actions can return a space where probabilities appear fixed into a space where the contingent possibilities behind them can be conceived, and in so far as they can then intuit a new probability distribution, these actions can be called creative.

Creativity, then, can be understood as performing a skill in such a mode that it intervenes in possibility space in dialogue with contingency. In many cases, the results will be novel, useful and surprising. However, such a “creative mode” does not depend on external assessment. It is a way of doing things around established expert practices, where material and epistemic agency are integrated in exceptionally flexible ways. We can manipulate sensorimotor contingencies through the affordances of designer environments that reconfigure the possibility space. Material and symbolic systems can stabilise such manipulations of sensorimotor contingecies and thereby enable a recursive engagement with them.

We can then conceive of a scale of performing actions in a creative mode by combining insights from 4E and predictive processing frameworks:

(1) playing around with the sensorimotor contingencies of the environment in improvisation and exploration (which combines material and epistemic agency); for example, an author trying out different rhythms while typing.

(2) providing modular elements in the designer environment that enable the manipulation of sensorimotor contingencies (which enables initial recursivity); for example, Frances Burney cutting up lines of dialogue in order to recombine them.

(3) devising modes to stabilise these manipulations in the designer environment (which enables longer time horizons and a stronger element of epistemic agency); for example, Georges Perec outlining the chapters of his book along a 10x10 grid.

(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 embedding of generative models and running inferences by proxies); for example, Marina Warner writing down her personal memories before engaging with her parents’ correspondence her family history.

Form gets progressively more concrete and symbolic along this scale, and it therefore enables progressively more complex manipulations to reveal the relations between contingencies and probability designs. Such an account enables us to see creativity as performing embodied practices “in a creative mode”. The creative mode is more likely to unfold in creative ecologies

(5) providing the necessary material support and recognition, as well as the protocols of an established field of creative practices, giving these practices a “feel for the game” (Bourdieu 1990); for example, Italo Calvino struggling with his plans for writing politically engaged realist fiction in the context of 1950s Italian neorealismo and Calvino’s own position as editor as Einaudi.

The model proposed here provides descriptive vocabulary and a distinction between different contexts in which creativity can emerge, from everday playful creativity or in the work of a professional novelist at the top of her game. It does not depend on the external assessment of the creativity of a product as “novel, apt and surprising”, and it does not fundamentally distinguish between different “types” of creativities, even though it builds on accounts of the different cognitive processes that go into performing a skill in a creative mode. Individual “producers” may be more or less inclined to avail themselves of the possibilities for action in such an environment, possibly depending on personality traits such as “openness to experience” or “need for closure” (Kruglanski, Jasko, and Friston 2020) that provide driving factors and motivations for individual agents and that will shape individual processes of creative engagement in important ways. Neither the external assessment of products, nor the type of the process, nor the personality traits of the producer describe performing a skill in a creative mode. What is necessary is an analysis of how contingency, form and practice are combined and into what contexts they are embedded.

**[Conclusion]**

Literature remains a sphinx. We can analyse what writers do and model what happens in writing a novel through practices, contingency and form. We can identify the continuities between general engagement with the lifeworld, play and writing a novel though vocabulary from 4E cognition and predictive processing. We can show how novels offer complex scaffolding for the alternative generative models that underlie relaxed precision with their phantom texts and characters gaining an agency of their own. However, we have also seen that the writing process is a recursive cycle where writers constantly move back and forth between material agency, driven by spontaneous cognition, and epistemic agency, where meta-cognitive control comes into play. There is no predefined protocol of sequences, when writers need to start, when they can expect creative insight to strike and when they bring the creative process to an end. Writers recognise contingency, make it part of their practice and translate it into literary form. At the same time, however, creative work also serves as a potent reminder that we are constantly subject to the inscrutable, mysterious smile of contingency in our lifeworlds.

**[Works Cited]**

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1. The book manuscript is currently under consideration for publication. [↑](#footnote-ref-1)
2. In the original nynorsk: “hvordan kan litteraturen gå nye veier det neste tiåret?” -- “Svaret ligger hos litteraturen. Eg prøvde å ringe ham og spørje, men han såg bare på meg, gjennom FaceTime-vindauget, der han stod, midt i samfunnet, verda og tida, like stumt og lukka som sfinksen I Theben.” (‘Fortattere Og Samtiden: Ti Norske Forfattere Svarer På Ti Spørsmål Om Norsk Samtidslitteratur’ 2019). [↑](#footnote-ref-2)
3. Perceiving the environment with a “looser” precision than normally has been linked to the strangeness of qualia in Andy Clark’s recent discussions of conciousness for predictive processing. Qualia, Clark and others have argued (see Clark, Friston and Wilkinson 2019), are momentarily “strange”. The sense that something is “sweet” or “warm” gives way to puzzlement, especially in settings of heightened (perhaps even aesthetic) perception, because of a lingering sense that thesecould potentially be perceived differently if we decided to explore the environment for other possibilities. [↑](#footnote-ref-3)
4. My understanding of form is based on Friedrich Schiller’s ([1794] 1980) notion that form and matter develop in a dynamic, dialective exchange in the literary artwork. [↑](#footnote-ref-4)
5. I would like to thank Mark Sprevak for our conversation after the PPIG Seminar, where the link between creative recursivity and Dennett’s narrative self arose. [↑](#footnote-ref-5)
6. The term “phantom text” is developed on the basis of the notion of “phantom readings” in the work of Camille Laurens (see Angelo 2012). [↑](#footnote-ref-6)