Re-imagining the mind: why brain plasticity and working fictions imply the mind is far from flat

1. Introduction

This review essay is written in response to the exhilarating experience of reading Nick Chater's beautifully written and provocative book, *The Mind is Flat*.[1] As someone steeped in Romantic epistemology, who has for many years worked on the role of imagination in the formation of beliefs, expectations, interests, and even preferences and on the role of metaphorical thinking in economics,[2] I was quickly drawn to many of Chater's themes.

The Mind is Flat is a scientific book that puts imagination centre-stage in the workings of the human mind: 'imaginative jumps' are 'at the very core of human intelligence' (208): they are essential to human perception and to our ability to make sense of each other (212). Metaphors are the essence of human thought and the search for meaning (209). Even our sense of self is a 'lightly sketched' literary creation (222). Topically, Chater is sceptical that artificial intelligence will ever reproduce the full glory of human intelligence because – with its focus on 'vast sequences of calculations, performed at lightning speed' – it cannot replicate the elasticity of human imagination and its creative use of metaphor to interpret novel and ill-defined problems (218). On these points, Chater would, I suggest, have met with applause from the nineteenth-century Romantic theorist of the imagination, Samuel Taylor Coleridge, who always insisted that the philosophy of mechanical calculation was fatal to any understanding of the human intellect.[3]

At the same time, *The Mind is Flat* is a sceptical assault on any notion of mental depth – an assault that would no doubt have appalled most Romantic thinkers as much as it unnerves modern psychoanalysts. Chater's review of many recent experiments leads him to argue that perception consists of a series of discontinuous (visual) snapshots that in turn trigger 'a cycle of thought' that locks onto and interprets elements of each snapshot before switching focus to the next snapshot and *imposing meaning* on that (181-2). The widespread belief that we survey an entire visual field (or scene) at once and have access to an inner world of thoughts or images corresponding to external reality is, for Chater, a 'grand illusion'. 'The sensory world is no more solid than the "world" of stories' (51). We are victims of a sensory 'hoax' (53). What is more, since any one of our step-by-step interpretations of the world lead to 'coordinated patterns of neural activity across whole networks or perhaps entire regions of the brain' (128), Chater argues that there is little room for mental multi-tasking or unconscious problem solving (165) and little evidence of background mental processing (except for purely automatic functions, like breathing). Chater concludes that 'the mind is flat': 'the very idea of metal depth is an illusion' (7) – a 'fiction created in the moment' (220). Most alarmingly of all, 'our mental motives, desires and preferences … don't exist' (123) except as figments of our imagination. Conscious experience is nothing more than 'the meaningful organisation of *sensory* experience' including memory traces (183f). The 'flowing stream of consciousness' is just another illusion (181); the mind is a master 'confabulator' (32).

Chater acknowledges the similarity of his conclusions to those of David Hume nearly three centuries ago: all we actually have access to are discrete sense impressions, and any belief in cause and effect, or in identity over time, is a creative projection of our imaginations that is read into the contiguous association of these disconnected sense impressions.[4] Like Hume, Chater acknowledges that we do – and in fact must – act on the basis of the fictional understanding of the external and internal world that our minds create with the help of imagination. Indeed, he admits that we are generally only conscious of our subjective interpretation of the world around us (which seamlessly reflects the continuous nature of external reality) and that we are rarely aware of the discontinuous process by which we arrive at that interpretation (182). Just as we 'see' whole images on TV, not the individual pixels activated by the screen's inner technology, so our conscious experience consists of '*the meaningful interpretation of sensory information*' (141). Chater underlines the creative element of such interpretation: the mind is 'an improviser' with a 'remarkable ability to creatively improvise our present, on the theme of our past' (7). He also stresses the individuality of experience. 'Each of us is a tradition' resembling 'corals layered' that are unique 'because of the endless variety of our layered history of thoughts and actions' (202). This is important because our interpretation of the world, indeed our whole mental life, 'follows channels carved by our previous thoughts' (203). Each 'new perceptual interpretation is based on memories of past interpretations' (197).

It is impossible to do justice to the nuances of *The Mind is Flat* in a few paragraphs. Instead, in the rest of this article I want to focus on some central issues raised by Chater's arguments that merit further consideration. These can be grouped under the following three themes:

- **The under-specification of imagination and its neural correlates**. Much of the originality of the book comes from its emphasis on the role of the imagination in creating the interpretations and illusions that dominate our lives. Nevertheless, very little attempt is made either to specify what the human imagination is or to find the neural correlates for it. I will argue that the Romantic poets and philosophers provide a good starting point for considering what faculties should be grouped under the umbrella term 'imagination'. The prize would be to show how these faculties operate physiologically and how they integrate discontinuous mental events in our brains both over time and into the shared nexus of meaning developed by social cultures. Among other things, this may lead to a deeper understanding of how imagination mediates the perceptual interpretation of sensory data in part through the application of socially learned conceptual and linguistic schemas.

- **Even if not entirely trustworthy, many products of imagination are vital and action-guiding 'working fictions'.** For much of the book, Chater focuses on dismissing various products of imagination – including our sense of identity or sense of continuous visual awareness – as illusions and hoaxes. While he acknowledges the necessity of some of these fictions as the basis of action, he almost completely ignores, for example, the extent to which we cannot act except by imagining the uncertain future. Our 'fictional expectations' or imagined futures[5] necessarily go well beyond what we can be known for certain and yet they are hugely consequential. As Chater himself notes, 'we have the power to imagine an inspiring future, and to

make it real' (223). Crucially, I would argue, this performative power of imagined futures – their power to structure behaviour – is mirrored by the real-world impact of other working fictions that our minds create when interpretating the present or the past. Indeed, in many ways, the imagination operates in similar fashion when visualising (or otherwise envisaging) the past, present, or future. In each case, the products of imagination may come to dominate our thoughts and structure our beliefs and actions. If this is true, should imaginaries and creative interpretations not be seen as critical functions of the human mind and intelligence rather than as illusory 'vapours' (53)?

- **The dismissal of mental depth and continuous experience may be a misleading exercise in semantics. In particular, the persistence over time of working fictions (especially narratives or stories) and the effects of brain plasticity repopulate the mind, even when it is denuded of an anthropomorphised unconscious or inner self.** Chater's insistence that the conscious mental world contains only the surface and moment-by-moment interpretations of sensory information (combined with memory traces) seems to ignore the constructive and *persistent* impact of worked-up and widely shared *narratives* and images. These are often direct objects of experience and provide the basis of our ongoing interpretations of new sense data. At the same time, while Chater is eloquent about how much our minds run along channels carved by past thought and experience, he does not explicitly integrate recent research on brain plasticity. For this reason, he largely ignores the impact that *social conditioning* and the learning of *languages* have on the physiological structures of our brains. This has implications for his strangely asocial analysis of perception – and may lead him to underestimate the depth of the mental processes of which we are unconscious. Finally, it is not clear that Chater entirely succeeds in banishing from the human mind the *homunculus* that he so abhors. His analysis is peppered with references to a vague 'we' – a subject (or proto-self) that wonders about the world (55) or queries some aspect of the visual scene (143). He even speaks at one point of an 'internal narrator' (183). And this may be as valid as it is revealing. For it is not clear how our minds focus on, and attend to, what matters if there is no 'will' that actively searches and seeks to understand its predicament, the better to exploit the opportunities presented**.**

2. **Specifying the nature of imagination and its neural correlates**

The imagination remains largely ignored by neurophysiology, psychology, and indeed – with a few notable exceptions (such as George Shackle, Benedict Anderson and Jens Beckert) – by social scientists. For this reason, I argue in *The Romantic Economist* that we can profit by revisiting the insights of Romantic poets and philosophers around two centuries ago. To do so, it is necessary to acknowledge that the imagination is not a discrete organ but an 'umbrella' or 'family resemblance' concept[6] used to denote a wide array of creative faculties of the mind that have at least some common elements – principally the visualisation (in a broad sense of the word) of what cannot be fully known, together with a fluid receptiveness to novelty. It is the imagination that enables us to extrapolate from mere suggestions and work up a fully fleshed out vision or narrative of a counterfactual or possible world. It 'allows us to construct a significant vision out of shards of memory, … join up the suggestive

dots of evidence before us, and so visualise or anticipate something we can neither know for sure nor see at present.'[7] At the same time, John Keats emphasised the importance of '*negative capability*; that is when man is capable of being in uncertainties, mysteries, doubts, without any irritable reaching after fact and reason.'[8] Openness to unexpected patterns emerging in sense data, and not rushing to impose a favoured interpretation, is a hallmark of mental fluidity and the capacity for innovation. A full neurophysiological account of imagination would need to explain both the *active* ability to flesh out imaginaries or narrative fictions and the mind's capacity for *passive* receptiveness to novel interpretations.

The imagination also fascinated the Romantics because they saw it is as the mysterious source of creativity, novelty and, consequently, existential freedom from mental or social determinism. Physiologically speaking, this creative aspect of imagination presumably involves the making of new connections between parts of the brain not previously linked and the establishment of new pathways across the synapses.[9] But it must involve also the ability to spot the significance of these new connections, so that a conscious focus on them can reinforce new pathways in the brain – new ways of thinking. Since the potential combinations of neurons or existing pathways in the brain are almost infinite, so in theory is the potential for human creativity. In practice, though, there are some psychological and perhaps physiological limits to mental agility and open re-interpretation.

Returning to Chater's main focus, Coleridge saw the imagination as a 'prime Agent of all human Perception.'[10] In this he was almost certainly influenced by Immanuel Kant's account of our minds reading into the world-as-it-appears-to-us certain structuring principles, while using the imagination to flesh out the everyday (and socially learned) concepts we apply to the chaos of sense data.[11] William Wordsworth followed Coleridge and argued that the human mind 'half-creates' the world it sees and is a 'creator and receiver both'.[12] What we see, in other words, is a co-creation of the stimuli impinging on our sense organs and the interpretative frameworks that our minds supply. The genius of these two poets was to understand that the same process that is obvious when the mind is consciously colouring our interpretations by the use of metaphors is at work in ordinary perception. Our ability to make sense of the world around us – to see it as a collection of meaningful objects – depends on our minds projecting theoretical, conceptual, linguistic or narrative structures as frameworks of interpretation. As Coleridge put it: 'You must have a lantern in your hand to give light, otherwise all the materials in the world are useless, for you cannot find them, and if you could, you could not arrange them.'[13]

The emphasis by Kant, Coleridge, and Wordsworth on the structuring of experience by concepts, language, and principles of selection runs counter to the reductive account of perception in *The Mind is Flat* in two important ways. First, while Chater argues that the interpretation of sense data depends on 'nothing more than the memory of past interpretations' (199) – an explanation of interpretation that threatens, I would suggest, an infinite regress – the Romantics emphasised that interpretation is heavily structured by the use of language, metaphors, theoretical models, and socially-generated conceptual schemas. The imaginative projection of these conceptual or narrative frames onto sense data to help construct interpretations of the external world provides the entry-point for *social* learning, *shared* languages, and the power dynamics of *grand narratives* as a critical influence on human perception and analysis. Secondly, while Chater argues that 'each piece

of interpretation is local and piecemeal' and that we cannot 'zoom out' to consider the meaning of entire entities or works of art (190), the Romantic emphasis on building narratives and visions from 'least suggestions'[14] suggests why this may be wrong. We constantly work up higher-level narratives or visions that help us interpret, and sometimes recognise anomalies in, the discontinuous impressions impinging on our senses. What is more, we consciously experience these synthetic products of the human imagination – our visualisations of an entire pastoral scene or cityscape or our narrative of Brexit – and they engage our emotions, colour our discrete acts of perceptions, and cause us to act in certain ways. Indeed, these fictional syntheses often feel more real to us and affect our behaviour more than the discontinuous perceptions that the 'trick' experiments that Chater discusses demonstrate are our actual sensory input at any given moment.

In short, while Chater sees perception (understood in the full interpretative sense) as a function of the imagination imposing meaning on discrete sense data simply by linking them to memory traces of past discontinuous interpretations, I would suggest we can spell out a fuller account of perception. The imagination fleshes out socially learned theoretical concepts, linguistic schemas, and persistent narrative frames and projects them – alongside memory traces of past individual interpretations – to help construct meaning in the world we see. Perception is then a co-creation of sense impressions and the imaginative projection of conceptual schemas, social narratives, and memory traces that together help parse reality in particular ways. A full neuro-physiological account of perception would therefore need, I argue, to uncover how the brain links language and theoretical models as well as memory to the processing in the cortex of visual input. Only then can we understand how we, as social and rational beings, actually see and interpret the world.

Two other aspects of the Romantic conception of the imagination merit a brief mention here: first, imagination enables us to place ourselves in someone else's shoes and see the world from their perspective. By enabling us to 'read' or enter into the mindset of others, imagination can generate sympathy with others or, alternatively, the sort of empathetic understanding that allows us to judge how best to exploit their concerns. Secondly, the essayist William Hazlitt argued that the faculty of imaginative projection involved in sympathy with the feelings of others is fundamentally the same as that required to generate current interest in the future feelings of our own future selves. Indeed, in his hands, the quintessentially utilitarian conception of the pursuit of self-interest dissolves into an imaginative and creative enterprise: because the future is uncertain and even our identities and preferences change over time, we must imagine the interest that our imagined future selves would feel for an imagined future, and it is this imaginary that excites in us a current 'emotion of interest' sufficient to motivate us to act.[15]

Hazlitt's theory has a marked resemblance to some aspects of Chater's account: our interests, identities, and preferences are not stable parts of our mental furniture but are constantly created by our imaginations. Where such Romantic conceptions differ, though, is that they saw these unstable and creative fictions as hugely consequential – as what, in Hazlitt's words, impregnate the future 'with life and motion'.[16] As John Stuart Mill later argued: 'the imaginative emotion which an idea when vividly conceived excites in us, is not an illusion but a fact, as real as any of the other qualities of objects.'[17] And this brings me to the next set of observations about Chater's thesis. In what sense, should we see imagined

interests and the emotions attaching to creative visions of an uncertain future (or, indeed, attaching to metaphorically coloured interpretations of the present) as unreal? Should we not instead see them as crucial working fictions (and related sentiments) that legitimately occupy a large part of our thoughts and drive much of our behaviour?

3. The substantiality of working fictions and attendant emotions

One of the tensions in *The Mind is Flat* is that, while it ends with a paean of praise for the creative power of the imagination, much of the book is more dismissive of the fictions it creates. Chater acknowledges that the brain is 'a biological machine that creates, improvises, dreams and imagines' (35) – a great improviser that is 'creating the mind, moment by moment' (220). But he also stresses time and again that the sense of an 'inner world' that our minds create is a 'mirage' (5) and that this 'product of our imagination is, of course, fiction not fact' (89). Furthermore, 'our sense of "grasping" the entire visual world before us is also a hoax. Our mental "pictures" of the world can have as many contradictions and gaps as any fictional world' (38). It is partly his conviction that such synthetic imaginaries are misleading hoaxes that leads Chater to claim that the mind is in reality 'flat' and that there is no inner world – only momentary imaginative interpretations of discontinuous sensory data in the light of memory.

In one sense, of course, the Romantic epistemology that Chater comes close to replicating at a micro level should in any case lead him to question the sharp distinction he makes here between facts and fiction. Since all perception and analysis is suffused by the colouring role of imagination in projecting conceptual schemas, metaphors, and memory traces, the world-as-it-appears-to-us is – as Iris Murdoch observed – 'not just a world of "facts" but a world upon which our imagination has, at any given moment, already worked'.[18] M.H. Abrams makes the point even more starkly: facts (as the derivation of the word from the Latin *facta* implies) are 'things made as much as things found, and made in part by the analogies through which we look at the world as through a lens.'[19]

For any scientist operating in a standard empiricist tradition, though, Mill's classic argument (discussed above) that imaginative emotion is not an illusion but a fact as real as any other may be far more pertinent and telling. Given their dominant impact on beliefs and action, the working fictions, imagined future interests, and attendant imaginative emotions that our minds create in the business of making sense of our predicament are as substantive as anything else pertaining to human minds and behaviour. These imaginaries matter – especially when they are schooled by rational analysis and learned experience – and, for this reason, a full neurophysiological account of how the brain works would need to account for their formation and influence.

Jens Beckert and I have isolated at least four types of 'working fiction'[20] that are central to human beliefs and behaviour and now dominate the modern mind:

- **Constructive fictions** are a feature of all our attempts to make sense of brute, inchoate, reality. We act *as if* the world-as-it-appears-to-us when constructed according to contingent categories, linguistic frames, and past interpretations that our minds supply resembles the world-as-it-really-is. Wordsworth put it typically

trenchantly: 'In weakness, we create distinctions, then / Believe that all our puny boundaries are things / Which we perceive and not which we have made.'[21]

- **Reflexive fictions** are a feature of any attempt to make sense of the *social* contexts in which we live in. Social reality is a pre-interpreted space, and if we want to understand its meaning for others, the better to understand their motivations and behaviour, we must create a simplifying (often narrative-based) interpretation of the constructive fictions they use to make sense of their predicament. We have no choice but to create interpretations of the action-guiding interpretations of others.
- **Fictional expectations** are particularly pertinent in capitalist economies characterised by widespread policy, product, and technological innovation and, consequently, radical uncertainty. In these circumstances, when the future is yet to be created and cannot be predicted even in probability terms, our expectations must be based on how we *imagine* the future and on the interest that we feel in these imagined futures. The modern mind is suffused with 'fictional expectations'.[22]
- **Modelling fictions** are a feature of all *scientific* attempts to make sense of the natural or social world. Models are a form of fiction with stories and metaphors often central to their construction and use.[23] These fictions can be used as diagnostic tools for teasing out systematic tendencies in the world around us, but they can also distort our analysis. In either case, they shape everyday beliefs, expectations, and practices, so that in this way, too, fiction is central to our thinking and blends seamlessly into social reality.[24]

In one sense, this catalogue of working fictions could fit perfectly with Chater's vision of 'the improvised mind'. Most of the thoughts that dominate our thinking, engage our emotions, and guide our actions are creative fictions. I would also add to the list a more personal kind of fiction linked to identity: most people create internal narratives that tie together the otherwise disjointed fragments of their past lives and provide them with a plot – a storyline – of how they imagine their futures will unfold. These personal narratives assign us a role in delivering imagined outcomes and tend to colour our interpretation of unfolding events. Furthermore, since the values and mental ledgers that we internalise from social discourse are frequently incommensurable and discontinuous, our choices about how to make trade-offs between them can often seem like an on-going process of self-creation, rather than the sort of predictable optimisation of stable preferences envisaged by economists.

At the same time, though, these working fictions and personal narratives run counter to Chater's insistence that the mind is flat and consists entirely of in-the-moment improvised interpretations of past and present. I would argue that what survives the brief encounters with sensory information that Chater describes, and what continuously occupies our conscious minds alongside these encounters, are the enduring products of imagination – the working fictions by which we live our lives. These include detailed narratives, plans, and templates that are constantly being worked on, updated, and supported by new analysis, evidence, photographs, and models that all serve to reinforce and flesh them out. Crucially, too, these evolving frameworks of interpretation are shared socially and hence constantly reflected back to us by partners, colleagues, friends, and enemies. In this sense, far from being fake, the working fictions that our minds create are experienced as something more permanent, continuous, and externally validated than our momentary personal interpretations of sensory information. They also enable us to experience, and focus on, a

much broader cross-section of both the external world and our internal mental landscape than would be possible without the help of these synthetic constructs provided by our individual and collective imaginations.

4. Reintroducing mental depth: products of imagination and the impact of brain plasticity

The enormous influence of the working fictions described above on many aspects of thought and behaviour (including our moment-by-moment interpretations of sensory information) and their key role in social interaction suggest that Chater's headline grabbing title, *The Mind is Flat*, may be a misleading exercise in semantics designed to slay the proverbial straw man. In this case, the straw man is a fully Freudian conception of 'the unconscious', with an anthropomorphised (and surprisingly phallic-centric) *Ego* and *Id* battling it out to control the hidden puppet strings of our unsuspecting conscious selves. Such a conception is largely outdated even in the world of psychoanalysis. Chater also has his sights set – more understandably – on unreflecting social-scientific conceptions of stable preferences and interests that are supposedly revealed by our conscious actions. But, in both cases, a desire to sweep away the legacies of past myths leads him to over-compensate and seek to empty the mind of all persistent features. In practice, Chater's subtle analysis does recognise that there are complex physiological processes and layers of memory traces of which we are almost entirely unconscious that help structure the moment-by-moment mental output (or 'read-out' of our brains) of which we are conscious (175f). In this sense, he admits that we do after all have mental depth:

> 'Over a lifetime, the flow of thought shapes, and is shaped into, complex patterns: our habits of mind, our mental repertoire. These past patterns of thought, and their traces in memory, underpin our remarkable mental abilities, shape how we behave and make each of us unique. *So, in a sense, we do, after all, possess some inner mental landscape* [my italics]. But this is not an inner copy of the outer world or, for that matter, a library of beliefs, motives, hopes or fears; it is instead, a record of the impact of past cycles of thought – rather than, as it were, any mysterious subterranean geological forces.' (203)

The admission here that we have a complex and highly individual internal mental architecture is, as this passage shows, conjoined with a repeated insistence that we have no static library of preformed beliefs, motives, emotional dispositions, and preferences. In one sense, my discussion of the contingent working fictions that our minds collectively create (and the imagined emotions and interest we attach to them) back up Chater's thesis. Our beliefs, interests, and preferences are a constant work-in-progress. Where I disagree with Chater, though, is in his reductive account of how we experience the evolving but persistent narratives and stories we tell ourselves about our motives and the theoretical schemas we use to analyse reality. One of the most arresting and, in my view, flawed passages in his book is this:

> 'We can talk and write about these things; we can express them in symbols and sketches. But we are conscious only of the perceptual properties of these words, symbols and pictures, not of the supposedly shadowy abstract realms themselves.' (185)

While it may be argued that we can never fully escape language and models and access abstract ideas directly, just as we can never have a meaningful experience of brute physical reality without the interpretational structures provided by language, it does not follow that our minds are unable to grasp the imagined worlds that we create out of a combination of language, symbols, memory traces, sensory information and abstract concepts. Indeed, I would argue that such working fictions and narratives are both persistent and occupy a large part of our minds' direct moment-by-moment attention.

Another surprising feature of Chater's analysis is that, for all his recognition that the structures of the brain are changed by past experience (or more specifically by past interpretations of that experience), he makes no explicit references to the *brain plasticity* theories championed by Norman Doidge, Merlin Donald, and other psychologists and neurophysiologists. The reason that this is important is that there is increasing evidence that the structure of the brain – and, in particular, the connections across the synapses between the billions of neurons in it – are strongly influenced by the use patterns of the brain prompted by cultural habits, the learning of language, and the internalisation of shared narratives. In other words, the absorption of our cultural inheritance and the adoption of social beliefs and shared conceptual frameworks actually affects the cognitive architecture of our brains – strengthening certain pathways and letting others fall into abeyance.[25] As Doidge notes, to 'a larger degree than we suspected' culture actually '*determines what we can and cannot perceive*.'[26] To the extent this is true, it becomes even more misleading to see the mind as somehow merely creating interpretations in the moment with the help of personal memory traces. We are *social* animals whose minds are continuously being reengineered in complex ways by our interaction with others. We may not be the plaything of our unconscious in the way that Sigmund Freud outlined, but we are strongly influenced by complex social conditioning and societal influences that affect our perceptual interpretations, behaviour, and mental habits.

Finally, there is the problem of the will. Despite his determination to show that the mind is flat, Chater's careful drafting has not managed entirely to exorcise the homunculus that has been a feature of many outdated mind-body dualisms. He speaks of an 'internal narrator' (183) and a 'we' who focuses on, and interrogates, aspects of the sensory world prior to imposing meaning upon it. He also argues that when we drive a car we need 'an active vigilance to direct our limited window of attention where it is most needed' (170). Indeed, one of the best things about Chater's account of the role of the imagination in creating our interpretations of reality is this acknowledgment that it involves *active* exploration rather than simply a *passive* process of mental associations. Coleridge would have agreed. But then he had no problem endowing our minds with a conscious 'will'. In a famous passage, Coleridge spoke of the imagination as a 'power, first put in action by the will and understanding, and retained under their irremissive, though gentle and unnoticed, controul.'[27] At the risk of making Nick Chater's eyes roll in despair, I suspect that we cannot make sense of the human mind, let alone behaviour, without acknowledging the existence of some sort of active will-to-understand, along with a will-to-act and – all-too-often – a version of Friedrich Nietzsche's 'will-to-power'. But I admit that I would be pleasantly surprised if I live long enough to see scientists find the neural correlates of the human will.

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