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Reading imaginatively: The imagination in cognitive science and cognitive literary studies[1]

Abstract: I argue that literary studies can contribute to the "imagery debate" (between pictorialist, propositionalist, and enactivist accounts of mental imagery). While imagery questionnaires are pictorially configured and conflate imagining and seeing with pictorial representation, literary texts can exploit language's capacity for indeterminacy and therefore elicit very different imaginative experiences, thus illuminating the non-pictorial qualities of mental imagery.

Keywords: Cognitive literary science, Enactivism, Imagery questionnaires, Kafka, Mental imagery, Pictorialism

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Introduction

The great imagery debate is still up in the air. For decades now, the "pictorialists" (notably Stephen Kosslyn) have been finding evidence supporting a theory of mental imagery based on pictorial, or analogue, representation, and for almost as long, "propositionalists" (particularly Xenon Pylyshyn) have been providing reasons why this apparent evidence doesn't actually support the pictorialist thesis. Rather more recently (since the late 1990s or so), a third voice (Nigel Thomas's) has joined the debate, arguing that we need to get away from the notion of representation – pictorial or propositional – as the explanatory medium and think about imagining as enactive, that is, as a way of acting. This view, however, has so far failed to break the deadlock, perhaps partly because of the long folk-psychological history of thinking about what the mind does in terms of representing things, whether in the form of the Platonic wax tablet or the twentieth-century computational brain.

1 This article began life as a conference paper presented at the Cognitive Futures of the Humanities: 1st International Conference, Bangor University, 4–6 April 2013. I'm grateful for all the feedback I received from those present.

In this article I build on arguments I've made elsewhere (Troscianko 2010 and forthcoming 2014a) that we should take the enactivist view seriously despite its being much less fully developed than the other two accounts. I've already set out in detail the arguments against pictorialist theories of imagination, so I won't spend too long on them here; instead I'll focus on the features that connect pictorialist and propositionalist accounts and make them theoretically vulnerable, before briefly outlining some evidence for the enactivist view. I'll then go on to discuss how conceiving of imagining as enactive may change our understanding of how fictional texts stimulate imaginative responses in readers, using the concept of "cognitive realism" as a starting point, and focussing on the question of the amount of detail that's given in textual descriptions and may or may not be present in the resulting imaginative experiences. Then I'll come full circle and offer suggestions as to how research on literary imagining can feed back usefully into scientific research on mental imagery. In particular, I'll discuss imagery questionnaires with respect to the problem of pictorialist bias and the potentially confusing concept of "vividness". In conclusion, I'll outline possible empirical directions for assessing pictorialist and enactivist accounts of mental imagery in the context of reading fictional texts.

Three views of seeing and imagining

Kosslyn's original (1980) pictorialist (he has since called it a quasi-pictorial or, more recently, a depictive) account of vision and imagination remains essentially theoretically equivalent in its 1994 and 2006 incarnations, although the original computational model has become a neuropsychological one (Barkowsky 2002: 38, 45); Kosslyn describes his 1994 theory as an 'extension' in which 'the previously inferred mechanisms have not been rejected but rather have been recast and further articulated' (1994: 388), and the 1994–2006 transition can be understood in similar terms. In Kosslyn's model, an image in the form of a "quasi-pictorial entity" or a "'surface representation'" is constructed in the "visual buffer" either from the retinal image (in seeing) or (in imagining) from a long-term memory store of "'deep representations'". The quasi-pictorial entities are available to "consciousness", and the information they contain can be read off by the "'mind's eye'" or 'mind's eye interpretive function' that "'looks'" at the display (Kosslyn 1980: 6; see also Thomas 1999: §2.1.1). The multiple scare-quotes are clues to the fact that there's some linguistic equivocation going on here: for each of his two key terms, Kosslyn takes a standard metaphor (picture in the head, mind's eye) and makes the metaphorical aspect more palatable by calling it something a bit different (quasi-pictorial entity, mind's eye interpretive function)

while still relying on the metaphor for the explanatory purchase (the picture in the head does actually have to be looked at by the mind's eye). In a more recent discussion (Kosslyn et al. 2006: e.g. 14–15) Kosslyn similarly uses the concepts of "functional space" and "functional depiction" so as to retain the explanatory power of pictorial representation while avoiding the implication that he's necessarily talking about real pictures, but he reverts to actual-picture metaphors when summing up the functionality of central components of the model: "The visual buffer, in essence, is the canvas upon which images are painted; it is the medium that supports depictive representations" (2006: 19). The important questions are left unanswered: firstly, what the "mind's eye" might be or how it might function, i.e. just how it could "look" at the display, without needing to be a miniature replica of a whole cognitive system capable of visual and interpretive procedures; and secondly, how this looking at a display, even if adequately explained, could possibly yield conscious experience. The first of these problems can be broadly formulated as the "homuncular fallacy", in which capacities of a whole organism are attributed to a part of an organism (Hyman 1989), as in the "mind's eye".[2] The inevitable corollary of positing a homunculus is an infinite regress, in which the mystery to be explained just gets pushed back infinite levels: my mental pictures need a homunculus (a little man in the head) to look at them, so the homunculus's images must too, and so on. Secondly, and perhaps most crucially of all, neural representation of the content of mental imagery (or the visual percept) doesn't provide any kind of solution to the hard problem of how or why a brain state should, in a commonly used but very slippery phrase, "give rise to" a subjective experience. Indeed, Kosslyn et al. (2006: 40) don't even pretend that their model could answer this kind of question: "It is important to realize that there is nothing paradoxical or incoherent in the notion of a 'mind's eye'. We can think of the mind's eye as a processor that interprets depictive representations (which in turn – somehow – ultimately give rise to visual perceptual experiences)" (see also Kosslyn 1980: 30). Even if the "interpreting" of pictorial representations could be satisfactorily modelled, we still wouldn't be any closer to a solution to the hard problem.

In Pylyshyn's (2003) propositionalist account, the content of visual and imaginative experiences is encoded not in an analogue form but in a propositional – that is, language-like – form, including both elementary symbols and formal rules dictating how the symbols can be combined (Stose and Kosslyn 2001: 7193).

2 Kosslyn et al.'s (2006: 40–1, 170–1) claim that because imagery operates using the same cortical systems as vision and no one worries about homunculi in vision they can't be an issue in imagery is not persuasive: lots of people do worry about homunculi in vision (e.g. O'Regan and Noë 2001a, Pylyshyn 2003).

Although Pylyshyn has been vociferous in his criticism of Kosslyn's conclusions from evidence of the visual system's involvement in imagery, Thomas (2010) has pointed out that Kosslyn's concept of the "deep representations" from which "surface representations" are constructed is fundamentally propositionalist: long-term memory, according to contains *descriptions*, not images (see also Barkowsky (2002: 39–40) on "deep representations" as propositional), and Kosslyn et al.'s (2006: 8–14) discussion of depictive representation characterises it, like descriptive representation, as a code with semantic symbols and syntactic rules. The two accounts also converge in how they deal with the issue of intentionality in imagery. Mental imagery, as opposed to pictures, seems to contain its interpretation within it; thus, when presented briefly with a bistable ambiguous figure like a Necker cube or a duck-rabbit, so that there's time to see only one of the two possible interpretations (just the cube with the lower-left face in front, or just the duck), people are unable to use mental imagery to find a second interpretation (Chambers and Reisberg 1985, Thomas 2010). The pictorialist response to this is to say that mental imagery occurs under a description, i.e. a participant in this study would form a quasi-pictorial representation of the figure labelled as "duck" and subsequently be unable to avoid interpreting it that way – although it doesn't intuitively follow that this should be the case or that such a label would necessarily determine future interpretations of the analogue representation. In sum, then, the pictorialist and propositionalist accounts of seeing and imagining are fundamentally similar in their appeal to underlying propositionalist representation, and in fact Kosslyn now (Kosslyn et al. 2006: 19) claims that the depictive theory doesn't deny that propositional representations are sometimes used, only that depictions can also be used. How this is meant to bridge the "explanatory gap" between brain states and experience, however, is usually simply elided in phrases that express the emergence of consciousness from representation, but don't explain it (Pylyshyn 2003: xv).

The alternative to these views is the enactivist account, in which the role of representation is reduced to the neural encoding of instructions for exploring the world, with knowledge of the governing laws of sensorimotor contingency (O'Regan and Noë 2001a) – that is, with knowledge of how the visual input would change if I or the object I'm looking at were to move. The neural instantiation of these instructions for exploration, based on the learning and mastery of sensorimotor contingencies (e.g. invariants of retinal stimulation), may be a composite of encodings in the primary visual pathway and the motor and oculomotor systems, although these possibilities aren't without their problems (Wallis and Wright 2009), and as yet no neuroscientific research seems to have been done, partly because O'Regan and Noë make it clear that brain states alone can't account for the phenomenology of perception: while "mastery of sensorimotor

contingencies may be neurally encoded, [. . .] this mastery does not itself reside in the brain [. . .] it resides in the creature as a whole, in [. . .] the whole neurally enlivened body" (2001b: 85). This isn't to say that the brain isn't centrally involved, however, and the details need to be clarified. For now, though, the main point being made in the sensorimotor account is that neural representation is not of the external world. Positing such a representation is not just problematic, theoretically and in storage/computation terms, it's also unnecessary; the world serves as its own (re)presentation, in that we can always look again when we need to. This availability may lead us to think that at any given moment we're seeing more than is actually the case; in fact, our visual access to the environment is, in enactive vision, enacted on a "just in time" basis (Rensink 2000). When you look at an apple, for example, your visual experience of the apple is determined precisely by the fact that you can't see all of it and that you know that if you move your eyes or head the visual input will change in law-governed ways, bringing hidden parts into view; this is what allows us to experience the apple in full even though at any one moment we can see it only partially (Noë 2002). Findings on change blindness (e.g. Simons and Levin 1997) support this thesis insofar as they confront us with our surprising inability to notice things even if afterwards we think they should have been obvious, and hence with the paucity of visual content despite its experiential richness (but see Troscianko forthcoming 2014a for some caveats). Research on active vision (Findlay and Gilchrist 2003) and "deictic", or action-controlling, vision (e.g. Ballard et al. 1995) also supports the "just in time" thesis and the importance of potentiality to visual experience. These principles can be extended to the imagination: I don't have a mental image of the cat I'm imagining, but I perform the same kinds of exploratory behaviours as when I see one, with weaker forms of sensory feedback provided from memory. Research on the correlation between eye movements when seeing and when imagining (Johansson et al. 2006, Spivey and Geng 2001), on the role of head movements in imagining (Ruggieri 1999), and even on the change in lens thickness in the eye when imagining just as occurs when seeing (Ruggieri and Alfieri 1992) supports the notion that imagining isn't about building up a picture in the head, but is a form of ongoing exploration just as is seeing. This closes down the explanatory gap opened up by mental representation, because consciousness is in and of the world, not somehow yielded by a partial neural replica of it.

In the following discussion, I'll make pictorialism my primary point of comparison with enactivism, because the specifically pictorial representation – i.e. the "surface representation" being "looked" at by the "mind's eye interpretive function" – makes the problems of representationalism especially acute, particularly when thinking about language-cued mental imagery. My argument will centre on the notion of indeterminacy, which Pylyshyn (2003) discusses

as one of the features of mental imagery that propositionalism predicts and pictorialism doesn't, but since both forms of representation entail the theoretical problems outlined above, my argument will be that mental imagery – imagination, or imagining, as I'll prefer to say – shares some fundamental features with language, not that it ultimately *is* some language-like thing. "Language" here means all language, not literary language in particular, although I'll suggest that literary language can be particularly significant in countering the prevalent assumption of equivalence between description and verbal picture-painting. I'll proceed from this claim about language and imagination to suggest how the scientific study of mental imagery might benefit from greater sensitivity to the fact that linguistic prompts to imagining needn't be pictorially configured, and that we can find out important things about imagining when they aren't.

Enactive imagining and literature

If we think about the primary differences between what pictorialism and enactivism entail for imagining, many of them come down to the issue of detail, and here the enactivist account seems to accord better with the phenomenology of imagining, although individual differences in people's imaginative capacities mean that some people may imagine in what feels like pictorial detail. Pylyshyn gives the following example: "I often feel I have a vivid image of someone's face, but when asked whether the person wears glasses, I find that my image is silent on that question: it neither has nor lacks glasses, [. . .] nor does it contain the information that something is missing" (2003: 35). My mental image – or my imaginative experience – may simply not specify; Ned Block (summarising an argument by Dan Dennett) encapsulates this feature of imagining as the capacity of images to be "*inexplicitly* noncommittal" (1981: 12–13). The black cat I imagine (stroking) may or may not have white paws, and if this doesn't become relevant to my concerns when imagining – for example, if I don't actually imagine stroking her paws – then there will never be a fact of the matter about whether my "image" contained white paws or not; they neither were nor weren't white (or any other colour), and there was no smudge or blurry patch where that information was explicitly missing/absent.

A number of arguments have been put forward to counter the indeterminacy thesis (the argument that mental imagery can be indeterminate in ways pictures can't), including that Impressionist pictures don't "need to specify", that images fade at a fixed and relatively rapid rate, and that the "deep representations" underlying analogue images may be indeterminate in a way denied of pictorialist images (e.g. Cohen 1996). The last of these is of course not a pro-pictorialist argu-

ment at all; it simply resorts to propositional representation as providing the explanatory force, and begs the question of why it should be the "quasi-pictorial entity" and not the "deep representation" that's viewed by the "mind's eye function". The first is tricky to sustain, because Impressionism is a genre fundamentally dependent on the viewer's input for the mixing of colours, the perception of boundaries, etc., so this leaves us with an exacerbated version of the question of how, if we posit a neurally instantiated picture, the "mind's eye" is meant to perform all these perceptual-interpretive acts without being a real eye. The suggestion that there's plenty of detail in our mental images but the details fade quickly as we interrogate them is simply a misunderstanding of the indeterminacy thesis, which doesn't state that what we imagine can never be detailed, but simply that it needn't always be: indeterminacy is a capacity, not a constraint.

Language shares with the imagination this capacity to be inexplicitly noncommittal: a linguistic description of a cat has complete freedom not to specify the colour of the paws, whereas a picture, to avoid doing so, would either have to portray the cat from an unconventional perspective or in unconventional incompleteness, or have to include some kind of ambiguating feature like a smear.[3] This means that language has the capacity to stimulate an imaginative response in a more flexible and efficient way than pictures can, by exploiting its shared capacity for indeterminacy, i.e. by being cognitively realistic in this respect. I've suggested elsewhere (Troscianko 2010) that this is what Kafka's writing does, and that understanding this fact can help us account for the strange "Kafkaesque" power of his fiction, and I'll build on this argument in what follows. Nonetheless, pictorialism has a preeminent status in the history of thought about the function of language and literature as a kind of verbal picture-painting, a status which can be attributed to the folk-psychological understanding of vision and imagination as working pictorially, which in turn derives from all the highly developed mechanisms by which the visual system compensates for the absence of detailed representation of the world, like motion and pop-out detectors (Troscianko forthcoming 2014a). This means that everyday language, as well as popular literature and the Realist tradition on which it's based, often don't exploit the capacity that language shares with the imagination, instead appearing to work on the principle of the more the better when it comes to descriptive detail. Extended descriptions of setting in Realist novels are the prime example of what Anežka Kuzmičová (2012a: 309) characterises as the over-representation of visual complexity in literature:

3 In speaking of pictures here, I mean the depictive properties of pictures themselves, not the perceptual processes that may go into viewing them (cf my response to the Impressionism argument). Vision, as I've said, shares non-pictorial capacities with language, but when we look at pictures, those capacities are partially constrained by the pictorial medium.

the description of complexity seeks (presumably) to maximise imaginative response, but may result in an over-complex stimulus that baffles more than it stimulates. Such descriptions may not be entirely "non-imageable", as Kuzmičová (ibid.) claims, but they do seem, as much as anything more enjoyable, to channel our attention into a relatively effortful coping with the visuo-spatial complexity, as in the opening of Theodor Fontane's (1888) novel *Irrungen, Wirrungen* (*Delusions, Confusions*; my translation):

> At the intersection of the Kurfüstendamm and Kurfürstenstrasse, diagonally across from the Zoological Garden, there was still, in the middle of the '70s, a large market garden, which stretched out in the direction of the fields; the house belonging to this, small and with three windows, situated some hundred paces back in a little front garden, could still, despite the fact that it was so small and secluded, be readily spotted from the street that led past it. Yet another part of the market-garden as a whole, what in fact amounted to its real core, was hidden by precisely this little residence, as if by a stage-curtain, and only a little wooden tower, painted red and green, with a clock-face, half broken off, below the tower's top (no question of an actual clock being there) suggested that behind this curtain something else must be hidden – a suspicion which came to be confirmed by a flock of doves that flew up from time to time, swarming around the turret, and even more so by the occasional barking of a dog. Where this dog was actually to be found was, however, beyond the powers of perception, although the front door, hard by the left corner of the tower, always ajar from dawn till dusk, permitted a glance into a little piece of courtyard. (1971: 319)

Even if we do find it easy to keep hold of all the details here and imagine them as a whole – and given the large variation in people's tendencies and abilities to imagine (Cui et al. 2007), some people may well, though I definitely don't – that isn't to say that the imageability of the description necessarily enhances the reading experience it induces. On the contrary, readers (today's readers, at least; how things may have changed over the centuries, and specifically how technological advances might have affected attention span, is a question for another time) tend to evaluate long descriptions negatively, and simply skip them: Daniel Allington (2011: 323–4) reports reading-group conversations in which readers talk about how "to be honest I've found my eyes skipping [. . .] you know when it gets very long", how "there were a lot of descriptions of day-to-day as I was sort of reading and thinking . . . come on let's get on with the story", and how "I think he [Steinbeck] described things too much I swear the whole first chapter was describing the *morning* it was so boring". These considerations suggest that long descriptions, rather than prompting detailed imagining, may rather try the reader's patience, and that literary descriptions which keep things short and simple may work better in terms of eliciting an engaged and fluent imaginative response from the reader. But can we say more about what kind of textual omissions might be effective, rather than just annoyingly vague?

I've discussed elsewhere (Troscianko forthcoming 2014b) how objects described in basic-level terms, which are used preferentially by Kafka, might facilitate imaginative fluency by activating anticipatory responses to the sensorimotor affordances associated with those objects, and similar criteria may apply to the description of actions. Kuzmičová (2012b: 28–9) suggests that what she calls "dynamic veracity" – that is, congruence between the time taken to perform an action and to read about it – might contribute to increasing the reader's feeling of "presence" in the fictional world. If an action is described in a "simple mentioning" instead of in a detailed enumeration of its constituent parts, "veracity" (Kuzmičová 2012b), or cognitive realism, may be enhanced, with positive effects on presence.[4]

Recognising that for these kinds of reasons imageability and experientiality aren't the same thing is an important step in disentangling the confusion surrounding vividness, a key term in discussions of mental imagery. As Jajdelska et al. (2010) point out, the term is commonly used to denote two fundamentally distinct things: level of detail and/or accuracy on the one hand, and intensity on the other. The two are often entwined not just at the level of analysis, but also in experiential report, as illustrated in Herz and Schooler's (2002) suggestion that the emotional intensity of odour-cued "involuntary memories" may lead people to overestimate the "vividness" and "specificity" of those memories; if a strong sense of being "brought back" is induced (by olfactory cues, for instance), this can result in an impression of more detail being accessible than is actually the case. But it isn't at all clear here how vividness is being analytically differentiated from specificity: indeed, Herz and Schooler's four measures are vividness, specificity, emotionality, and the feeling of being brought back, and vividness (which isn't defined) seems to straddle specificity and emotionality. A clearer and stronger claim would be that emotion makes us overestimate detail, which ties back into my earlier point that the two needn't be directly proportional. It's fundamental to establish the meaning of terms like "vivid" before we start applying them to imaginative experiences, so that we can get purchase on the distinction between richness of experience and amount of detail available, accessed, or given in that experience, without simply assuming that the two have a directly proportional relationship. The conflation in "vividness" of imageability and experiential richness is parallel to the conflation of vision and imagination with pictorial representation that occurs in both folk-psychological and pictorialist

4 Presence has been successfully measured in audience responses to film using a simple line-bisection task (e.g. Troscianko et al. 2012), and its validity supported by a correlation with pupil dilation, so this kind of hypothesis about reading experiences is eminently testable.

accounts of these faculties (and of the function of language): underlying both is the assumption that detailed representations are necessary for appropriate emotional responses and for appropriate perceptually guided behaviour. Unfortunately, because vividness is the operative measure in the most commonly used questionnaires on mental imagery, the same conflation occurs there too, which makes it impossible for these questionnaires to assess the nature of the relationship between the two variables.

Imagery questionnaires: "vividness" and "pictures in the head"

The concept of vividness plays a key role in imagery questionnaires from Galton (1880) to Betts (1909) and Marks (1973). Marks's very frequently used Vividness of Visual Imagery Questionnaire (VVIQ) is designed to assess individual differences in the "vividness" of mental imagery in the visual modality. The VVIQ consists of four separate imaging tasks, each performed first with eyes open and then with eyes closed. In the third task, for example:

> Think of the front of a shop which you often go to. Consider how you visualize it.
> 9 The overall appearance of the shop from the opposite side of the road.
> 10 A window display including colours, shape and details of individual items for sale.
> 11 You are near the entrance. The colour, shape and details of the door.
> 12 You enter the shop and go to the counter. The counter assistant serves you. Money changes hands.

This task, and especially items 10 and 11, obviously prioritises static detail over other facets of the imaginative experience. Item 9 taps an experience of visual "gist", albeit still from a detached and static standpoint, while item 12 describes an interactive experience that differs substantially from the other items. Respondents are asked to rate their imagery for each item of each task on a five-point scale from "perfectly clear and as vivid as normal vision" (1) to "no image at all, you only 'know' that you are thinking of an object" (5). The intermediate rankings are "clear and reasonably vivid" (2), "moderately clear and vivid" (3), and "vague and dim" (4). No definition is given of the term "vivid", but the preamble is phrased in explicitly and repeatedly pictorialist terms. It begins: "Visual imagery refers to the ability to visualize, that is, the ability to form mental pictures, or to 'see in the mind's eye'." It's admittedly quite difficult to talk about imagining without using some pictorialist phrasings, since turns of phrase like "bring an image to your mind" are so prevalent, but with care it can be done. Here, though, the language of "images", pictorially construed, has the effect of pre-defining

vividness as pictorial, i.e. as being about the amount of detail given in a two-dimensional analogue representation. In the rating scale, these connotations are expressed in the term "vivid", in combination with "vagueness" (and its implied opposite, precision) and "dimness" (and its opposite, brightness). Again, this means that if participants were to experience imaginatively something extremely vivid in the sense of being emotionally intense, they'd want to call this "vivid" but would thereby be forced to imply that what they experienced was full of detail, and perceptually precise and bright, none of which need have been the case.

The VVIQ also includes a second conflation: from a starting point in which imagination and pictorial representation are conflated, it goes on to conflate this picture-like imagining with seeing, notably in the phrasing of the description for rating 1. This means that respondents also have no way of rating their imaginative experiences as both lacking in comprehensive detail and nonetheless perceptual in quality: gappy, task-dependent, characterised by gradations in focus, etc. So forcing questionnaire respondents to go along with the double conflation of mental pictures with imagining and imagining with seeing may well cause problems. Indeed, Chara and Verplanck (1986), investigating the construct validity of the VVIQ, report just the uneasiness predicted by a non-pictorialist account of imagining (and seeing). They asked participants to perform a small additional task at the end of the experiment: "Please look out the window for 30 seconds and then turn around, face the door and describe your present imaging experience of the scene outside the window. Using Marks' rating scale, how would you describe this experience?" They found that

> when asked to describe their imaging experience subsequent to looking out the office window, not one subject reported an experience resembling "normal vision," a questionnaire rating of *one*. In fact, the more participants were probed about Marks' imagery items they had rated *one*, the less likely they were to even continue in saying they had an imaging experience "clear and reasonably vivid" (rating *two*).

When probed on their rating criteria, participants become less willing to equate imagining with seeing, and this reluctance may be enhanced by the pictorialist, cognitively unrealistic way in which imagining is presented in the VVIQ.

Imaginative prompts: literary texts and imagery questionnaires

The hypothesis that these conflations of pictures, imagination, and vision may result in misleading ratings is supported by empirical work I've carried out which

offers the possibility of comparing VVIQ ratings with imaginative experiences prompted by literary stimuli. Quantitative mental-imagery data for the literary responses aren't available, since a direct comparison between the VVIQ and the literary text wasn't the purpose of the study, but evaluation of the VVIQ scores against the qualitative response data is quite revealing. The study in question (Troscianko, in preparation) involved 34 participants reading a short story by Kafka, "Schakale und Araber" ('Jackals and Arabs'), which was split into 34 short sections. Participants (including 21 women and 13 men, all bilingual in English and German, with an average age of 31, and of a variety of educational backgrounds and professions) were asked to respond to each section verbally (into a digital recorder) with the instruction to "describe any and all aspects of your reading experience: any thoughts, feelings, interpretations, evaluations, personal memories, ideas, or images that are conjured up for you by what you read". One might expect the VVIQ scores to manifest a similar tendency or ability to imagine (in terms of clarity, detail, etc.) as the responses to the story, yet when we look at the extreme cases, the discrepancy between the two is quite striking. For example, one participant (Participant 7) rated his mental images as 5 (no image at all) on all of the VVIQ tasks, but gave verbal responses that indicated a rich and complex range of imaginative responses (the story segments were presented in the German original, but are given here in English translation):

> *And what had been so far away was suddenly close. A throng of jackals around me, eyes gleaming, going out, in matte gold, slim bodies, moving as if under a whip, predictably and swiftly.*
> The next segment is about Schakale, the description is a bit unusual; I wouldn't associate the golden colour with their eyes, "in mattem Gold erglänzende, verlöschende Augen" ['eyes gleaming, going out, in matte gold'] – I mean the picture is quite unusual. I also cannot imagine that they would move like under the influence of a whip.
>
> *One was already hanging on to the throat and with its first bite found the artery. Like a frenzied pump trying to extinguish an overwhelming fire with urgency and futility, every muscle of its body jerked and twitched where it was.*
> They start feeding on the camel; again it's a strange picture. Like a pump – I don't understand this picture. Every muscle of his body – so what does this "Feuer" ['fire'] stand for?

In these responses (and many more not quoted here), the participant clearly indicates that an imaginative response to the textual description has occurred in the visual modality: he speaks of "pictures", because pictures are the staple reference point in talking about imaginative experience (and as a native German-speaker speaking in English, he is likely to have derived the English "picture" from the German "Bild", for picture or image). But his responses, like the de-

scriptions by which they're prompted, are situated, dynamic, and fragmentary: the intermittent gold gleaming of the jackals' eyes, the movements of their bodies as if under a whip, and their feeding on the camel are imagined in all their interactive changeability, as is the "pump"-like bleeding of the camel itself. The other unifying feature of these responses is the failure to understand: the imagining constitutes or brings about incomprehension ("the picture is quite unusual", "I [. . .] cannot imagine that", "it's a strange picture", "I don't understand this picture"). These difficulties could be interpreted as resulting from the extreme oddity of Kafka's text: with talking jackals asking a European to kill their enemies the Arabs with a pair of blunt sewing scissors, the text is so odd that the imaginative experiences it prompts are bound to be hard to make sense of. This interpretation is supported by the number of similar reports from other participants of not understanding things, whether the things not understood are being imagined ("It seems to me a completely bizarre sentence. It's certainly some image I haven't thought about before: having lots of wild beasts on a dead camel, and the formulation "hoch zu Berg" ['high as a mountain'], I would think more of an actual mountain than of just a camel!", P1) or, much more frequently, not: "I don't really understand the last sentence: what it is that should be drunk, and purified" (P1). However, the difficulties reported by this participant are unusually consistent, even in response to more straightforward sections of the text like the opening lines, in which the protagonist tries to get to sleep. This fact, in combination with the extreme VVIQ ratings, suggests that there may be a fundamental issue relating to the participant's ability to use his imaginative capacity as part of the process of engaging with any textual stimulus more complex than mere instructions to imagine. But this may be a rather separate matter from the fact that mere instructions to imagine, when pictorially configured, apparently result in no imagining at all.

The question of interpretive difficulty and its interaction with imagining goes beyond the scope of this article, but overall this participant, with apparently abundant but problematic imaginative experiences in response to Kafka and no reported imaginative experiences in response to the VVIQ, provides grounds for thinking that the perceptual aspects of these two stimuli – the VVIQ giving isolated, mostly static visual descriptions and "Jackals and Arabs" giving enactive descriptions embedded in a narrative context – are significantly different in how they prompt imaginative responses, and therefore that the VVIQ isn't a good measure for mental-imagery ability irrespective of stimulus type. One study comparing ratings on the shortened version of Betts' (1909) Questionnaire upon Mental Imagery (QMI) and ratings of imagery during the reading of a fictional text (Long et al. 1989) found correlations between the two scores, and this may have something to do with the QMI being less centred on the visual, and hence the pictorial,

modality. Kosslyn and Thompson (2003) have also proposed that the ongoing debate about whether activity in primary visual cortex (V1) increases when imagining, as it does when seeing, should take into account the possibility that tasks to which the detailed geometric shape of objects being imagined isn't relevant may not activate V1, although they may still activate other retinotopically mapped areas involved in processing, for example, colour, motion, or spatiality (Thomas 2010). In short, it seems to really matter whether the stimulus to imagining is pictorially configured or not.

Similar conclusions can be drawn from the responses of two participants (11 and 16) whose VVIQ ratings were towards the other end of the scale. Participant 11 scored 27 (eyes open) and 22 (eyes closed), while Participant 16 scored 27 and 26 out of a possible total of 80 for each condition. This gives them average ratings of 1.53 and 1.66 respectively, i.e. somewhere between "perfectly clear and as vivid as normal vision" (1) and "clear and reasonably vivid" (2). Surprisingly, these two participants barely mentioned imaginative experiences at all while reading the story. There were only two mentions of actual imagining, both by Participant 16: "Yeah, quite ugly pictures come to mind. This seems to become a game, the dogs moving back and forth, and the Arab living out a sort of sadistic side of his personality" and "I'm trying to imagine how they all jump on this body; where it says 'hoch zu Berg' ['high as a mountain'] one thinks of a hump, a hump of a body, with the dogs climbing all over it. A rather ugly imagination, but then also quite natural, as when I've seen it in all sorts of wildlife documentaries." In the second response here, the imagining occurs initially in the mode of "trying", with apparent success explained as occurring in the process of thinking through what the effects of the textual imagery are and then associating it with remembered visual experiences. Other responses by these participants could also be construed as, for instance, emotional and interpretive responses to things that must have been imagined ("And now getting excited – 'Aug in Aug mit mir' ['eye to eye with me']; 'alle atmeten noch schneller, mit gehetzten Lungen' ['they all breathed even faster, with racing lungs']; there's really something going on"; "you don't associate 'hoch und weiß' ['tall and white'] with an Arab", "it seems like a very dangerous situation: somehow they have surrounded him"), but the visual imagining itself isn't foregrounded as one might expect given the reported strength of the two participants' imaginative responses to the VVIQ tasks. This doesn't mean it isn't happening; it may just mean that the interpretive challenge makes other aspects of response more salient, and that the imaginative aspects are subsumed more fully within the broader cognitive interaction with the text.

Literature's voice in the imagery debate

I suggest that the dynamic, enactive configuration of the descriptions (instructions to imagine, if you like) in Kafka's story, in contrast to the primarily static, pictorially detail-orientated instructions to imagine in the VVIQ, means that readers/respondents are likely to respond more readily to the former, which are more cognitively realistic, corresponding more closely to the non-pictorial nature of the imagination. A textual stimulus that taps into the qualities of the imagination, rather than qualities of pictures assumed to apply to the imagination as well, can be expected to result in some degree of discrepancy in response of the kind observed in an extreme form in Participant 7. My hypothesis about responses to a pictorial versus an enactive description is that the pictorial text might stimulate more detail and clarity than the enactive one, but that that this would be associated with more effort and less emotional intensity. The emotionally more intense effect of the enactive description might be one of ambivalence: I've suggested elsewhere (Troscianko 2010, 2013, forthcoming 2014a) that cognitive realism, such as in evocations of perception as enactive, may result in a feeling of being both compelled (because it engages the relevant cognitive faculty very directly) and unsettled (because folk psychology fairly consistently runs counter to the cognitive realities).

The qualitative nature of the textual responses in this instance prevents me from offering more substantial data in support of this hypothesis, but the relevant research ought to be done. This would involve presenting participants with an "enactive" and a "pictorial" description to be rated on the same series of scales, which should tap the key variables predicted by the enactivist and pictorialist accounts respectively, as well as variables that are neutral as to the two accounts. The scales would avoid using the term "vivid", instead splitting it out into its component parts: detail and emotional intensity. Complementary measures might then include rating scales to probe associated facets of response such as appreciation and effort, and an indirect behavioural measure like the eye-movement study by Johansson et al. (2006). The factors at work in the stimuli could also be further assessed for the effects of narrative context (i.e. plot, as the sum of all the actions in the story) on the two description types. In this way, literature and sensitivity to literary-linguistic effects might have the potential to further the scientific study of mental imagery or the imagination.

Existing literature provides a wealth of material to serve, with the appropriate manipulations, as the basis for test stimuli that may help draw out the fine-grained variations in imaginative response to varying stimuli, and establish whether the dissociations between the imagination and pictorial representation

which there are good grounds for supposing exist really do – that is, to participate in the still unresolved imagery debate. Given that language can but need not manifest the conflations between imagination and pictorial representation at issue here, and given that literary texts constitute a rich resource including both "pictorialist" and "enactivist" descriptive modes, literary studies may offer a valuable new empirical contribution to the imagery debate, and thereby move closer to establishing itself as a fully-fledged cognitive literary science.

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Bionote

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