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Is Rich Phenomenology Fragmented?

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Some philosophers argue that the content of iconic memory is conscious, called the Rich View. However, critics ain that only fragments of the content of iconic memory are conscious, called the Fragment View. Both sides cite different psychological experimental data to support their positions. Proponents of the Fragment View tend to assert that their view uniquely explains the data they rely on. The uniqueness of the Fragment View is challenged here. Newly introduced evidence suggests that the data supporting the Fragment View may also be compatible with the Rich View. Given the theoretical advantages of the Rich View in other respects, there are reasons to consider it the superior one.

Keywords: Rich View, Fragment View, Consciousness, Iconic Memory

Introduction

A persistent debate in the philosophy of mind revolves around whether our conscious experience is richer than the content we are aware of. According to the overflow argument, we have a rich conscious experience, yet we can only cognitively access a small portion of it. Proponents defend this view by referencing the famous Sperling experiments in experimental psychology.

In the Sperling experiment, subjects were shown a 3x4 matrix of letters for a very short duration using a tachistoscope. Subsequently, they were asked to report the letters they saw. The results revealed that subjects could generally report only three to four letters at random, which is less than half of the total presented. Astonishingly, even with limited reporting ability, subjects confidently claimed to have seen all the presented letters, a phenomenon referred to as perceptual richness or rich phenomenology. To investigate whether the subjects indeed saw all the presented letters, Sperling designed a new experiment. In this new experiment, each row of the matrix was assigned a different tone: for example, the first row was assigned a high tone, the second row a medium tone, and the third row a low tone. After the matrix was briefly presented, subjects were instructed to report the letters of the row corresponding to the tone they heard. For instance, if the medium tone was played, subjects were to report the letters in the second row of the matrix. The results showed that subjects could nearly accurately report all the letters in batches.

Sperling (1960) hypothesized that the reason subjects confidently claimed to have perceptual richness was that the information of the matrix content was stored in a large-capacity visual short-term memory system, later known as iconic memory[1]. Subsequent psychologists pointed out that the reason subjects could only report 3-4 letters at a time was that only a limited number of letters, aided by the attentional effects of the tone cues, transitioned from iconic memory into a system known as working memory, allowing them to be reported.

Overflow theorists, led by Block, argue that subjects have phenomenal consciousness[2] of full iconic memory content[3] and access consciousness of working memory content, which is the best explanation of the existing evidence (Block, 2007a). In the Sperling experiment, to say that subjects are conscious of the full content of iconic memory means that they are conscious of *specific letter-shape* representations of all letters in the matrix content (e.g., an "A" is represented as an "A"), rather than just feature fragments or a generic sense of letter-likeness, both of which can become more specific through attention (Block, 2011, p. 568). Although tonal cues provide attentional aid, allowing only the specific letter-shape representations of letters in the cued row to enter working memory for cognitive access, subjects *still* remain phenomenally conscious of the specific letter-shape representations in the non-cued row. The phenomenal consciousness of specific letter-shape representations in the non-cued row is called *overflowed* phenomenal consciousness. What the term "phenomenal overflow" refers to is, the large capacity of phenomenal consciousness overflows or exceeds the limited capacity of access consciousness (Block, 2007b, a, 2008, 2011, 2014; Brockmole

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[1] Landman et al. (2003, p. 156) proposed another type of visual short-term memory, referred to as fragile visual short-term memory, which is very similar to iconic memory. Given its limited impact on the arguments of this paper, a strict distinction between the two will not be made.

[2] To avoid confusion caused by the use of concepts, Block (1995) distinguishes the concept of consciousness into phenomenal consciousness and access consciousness based on the different properties involved. Phenomenal consciousness involves the experiential properties of consciousness, while access consciousness involves the cognitive properties of consciousness.

[3] Here, I use the term iconic memory content not to make any strict ontological commitments about iconic memory but merely to follow the general usage in experimental psychology. It refers to the large capacity of information briefly stored in iconic memory when subjects visually perceive the external world. Since the information stored in iconic memory in these Sperling paradigm experiments specifically refers to matrix content, this paper will not deliberately distinguish between iconic memory content and matrix content in its usage.

et al., 2002; Landman et al., 2003; Lamme, 2003, 2004, 2006; Sligte et al., 2008, 2009, 2010; Vandenbroucke et al., 2011).

However, not everyone agrees that subjects are conscious of the specific letter-shape representations of all letters in the matrix content, a position we refer to as the Rich View[4]. The rebuttal argues that the subjects' confident claims of perceptual richness are merely illusions. These illusion-based positions can be divided into two. One view, which we can call the Generic View, claims that subjects are conscious only of *generic letter-likeness* representations of all letters rather than specific letter-shape ones (Cohen & Dennett, 2011a). In this case, the perceptual richness—i.e., the sense of seeing all the displayed matrix contents—is an illusion generated by the conscious generic letter-likeness representation. Another view, which we can call the Fragment View, relies on their new Sperling-type experiment to suggest that subjects are only conscious *feature fragment* representations of all letters (de Gardelle et al., 2009; Kouider et al., 2010). The perceptual richness is an illusion generated by these conscious feature fragment representations. Regardless of which illusion-based explanation is defended, it poses a threat to the Rich View and undermines the argument for overflow. This paper will not discuss each of these two views in detail but will focus on the Fragment View.

The Fragment View relies on the interpretation of new data from slight variations of the original Sperling experiment. Sid Kouider and his colleagues claim that the Fragment View, in its uniqueness, is the most reasonable explanation for this new data, while the Rich View is incompatible with it. This paper aims to challenge the purported uniqueness of the Fragment View and to argue for the compatibility of the Rich View with the new data. The structure of the paper is as follows: Section 2 provides a detailed introduction to the argumentation of the Fragment View. Section 3 highlights what Kouider et al. overlooked. This challenges the uniqueness of the Fragment View. Then, it suggests the possibility of reconciling the Rich View with the new data used by the

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[4] Some also refer to the overflow theory as the 'Rich View', as it suggests that richer phenomenal consciousness overflows limited access consciousness. However, the 'Rich View' in this paper is different: it specifically refers to the view that subjects are conscious of the full contents of iconic memory. While Block and others typically endorse both the Rich View and the overflow theory, the two are *not necessarily* identical. The Rich View, as defined here, *only* concerns the *richness* of conscious experience, whereas the overflow theory further claims that this richness *exceeds* the limits of access consciousness. In principle, one could accept the Rich View while rejecting the overflow theory, or vice versa, though the latter position is less commonly held. There is an argument related to this in Wu's (2014, pp. 206-207) footnote.

Fragment View and explains why this reconciliation is worth pursuing. Section 4 introduces recent neuroscientific evidence and explores the new possibility that reconciles the Rich View with the new data, followed by addressing some potential concerns. Finally, Section 5 includes concluding remarks.

2 The Fragment View

The Fragment View originates from the interpretation of new data generated by a variant of the original Sperling experiment—Kouider et al.'s modified experiment (de Gardelle et al., 2009; Kouider et al., 2010). An array of normal letters and other symbols is presented for 500 ms and then "masked," with a pattern that makes them harder to recognize (masking was not used in the original Sperling experiment). The array might include rotated or flipped letters, such as an inverted "R," or non-letter symbols (wingding). An auditory cue is then presented, and the pitch tells the subject which specific row to focus on. The subject reports as many letters from the cued row as possible. In some trials, a "free subjective report" procedure is introduced, where subjects hover the cursor over a set of symbols and click when they believe a symbol was present in the original array. Wingding symbols were reliably recognized whether they were in the cued or uncued rows, but rotated or flipped letters were only recognized reliably when they appeared in the cued row—meaning that sometimes subjects saw a rotated "R" in an uncued row but reported a normal "R" during the free subjective report (Block, 2011, p. 569; de Gardelle et al., 2009, pp. 570-577).

Kouider et al. (2010, p. 304) explained the phenomenon where subjects reported rotated letters in the uncued rows as corresponding real letters. Before the tone cue, subjects were only conscious of *fragment representations* of all letters in the presented matrix. These fragments included common underlying *geometric features* between rotated letters and real letters. Only with the attention brought by the tone cue did these conscious fragments combine with the unconscious specific letter-shape representation of the cued row. This process enables subjects to become conscious of the specific letter-shape representations of the letters in that row. Due to the subjects' consciousness of only the fragments of the matrix content, their erroneous reporting occurred.

As previously mentioned, the Rich View posits that subjects were originally conscious of the specific letter-shape representations of all letters, rather than just fragments. However, due to cognitive access limitations, despite our perceptual richness of seeing all letters, we can only report the letters in the cued row. In contrast, Kouider et al.'s Fragment View is significantly different. The perceptual richness is an illusion caused by these conscious fragments.

Again, Kouider et al. hold the Fragment View due to new data from their variant experiment, which generated erroneous reporting performance—subjects *reported rotated letters as corresponding real letters*. If subjects were indeed conscious of the specific letter-shape representations of all letters, as the Rich View suggests, it would not explain why they exhibited this erroneous reporting performance. It seems that only the Fragment View, however, can adequately explain this behavior because subjects were only conscious of fragments. Within Kouider et al.'s framework, the erroneous reporting performance of the subjects *implies* that they were conscious of only fragments of the matrix content.

3 What Does the "Fragment View" Overlook?

3.1 Block's Passive Response Strategy

In less than two years since the Kouider et al. Fragment View, Ned Block provided a direct response and his response primarily involves two points. Firstly, he argues that this fragmentariness arises from the conditions predetermined by Kouider et al. in their designed experiments: Low-contrast stimuli and a mask. These additional conditions were not present in the original Sperling experiment. If the predetermined conditions are removed in Kouider et al.'s experiment, it remains uncertain whether the experimental data from Kouider et al. can still support fragmentariness (Block, 2011, pp. 568-569). This implies that further confirmation is needed to ascertain the reliability of Kouider et al.'s experimental data. However, Ned Block does not provide any substantial support for this idea. Furthermore, he shifts his focus to a second response.

Secondly, and more importantly, Block suggests that even if Kouider et al.'s experimental data is reliable, it doesn't matter. According to him, "the rate of errors due to illusion (always in the uncued rows) is estimated to be in the vicinity of 10%-15%, *not a surprising level* of error from the perspective of a 'rich' view of perception that also allows that the shape representations contain features and feature fragments, so long as the fragments are specific enough to perform the task with the observed degree of success (Block, 2011, p. 569)." Block's second reply is that the consciously fragments available to the subjects are sufficient to support the successful completion of the task of picking the letters not cued up in the Sperling experience. The erroneous reporting rate in Kouider's experiment is minimal, provided that subjects accurately complete the task. So, the data from Kouider's experiment still supports rich phenomenology.

Ned Block's second response can be interpreted as partially endorsing Kouider et al.' view. The reason it is only partial is that he acknowledges that subjects might truly be conscious of fragments of the matrix content, but he denies that such conscious fragments fail to support rich phenomenology. Block argues that even if subjects in the experiments by Kouider et al. erroneously report rotated letters as their corresponding real letters, this only suggests that they have conscious access to fragments, these conscious fragments are still "*sufficient* to determine the differences among the letters of the alphabet for 3-4 items in all three rows, a total of about 10.5 specific shape representations in consciousness. That would explain the results by what subjects say about their own experience while allowing for a minor illusion effect, as found by Kouider et al." (Block, 2011, p. 571)

It appears that Ned Block has adopted a retreat strategy: he no longer strictly adheres to the Rich View—that subjects are conscious of the specific letter-shape representations of matrix content. Rather, he acknowledges that subjects are conscious of feature fragment representations of matrix content, to some extent accepting the Fragment View. Nevertheless, from Block's perspective, this Fragment View is merely a weaker variant of the Rich View rather than being opposed to it. As long as subjects can complete the report task with a relatively high probability, "even if fragmentary, does involve enough phenomenally conscious shape information" (Block, 2011, p. 571). According to Block's response, the Rich View seems to have *split* into a Full Rich View and a Fragmentary Rich View. The Fragment View, from Block's perspective, is the Fragmentary Rich View. How convincing is this Fragmentary Rich View?

In their study, Kouider et al. (2009, p. 572) report that subjects erroneously reported rotated letters as their corresponding real letters at a rate of approximately 15%, which they characterized as *significantly positive*. However, in Block's response, he refers to the rate at which Kouider et al. described as significantly positive, as *not surprising* or *minor* (Block, 2011, p. 569). Firstly, this response appears somewhat passive, as Block fails to explain why an erroneous reporting performance rate of approximately 15% occurs in detail. They merely assert that this error rate is sufficiently minor to not influence the Rich View. Secondly, and more importantly, although Kouider et al. did not issue a definitive further response following Block's response, evidence previously proposed by Kouider et al. substantiates the notion that erroneous reporting performance is *more prevalent* in similar experiments (e.g., Kouider, 2010, p. 303; Kouider, 2004, pp. 76-80). Therefore, this illusion effect is not as minor as Block suggests. Block's passive Fragmentary Rich View as a response to Kouider does not seem particularly compelling.

If Block's Fragmentary Rich View appears passive and insufficiently powerful in explaining the erroneous reporting performance in Kouider et al.'s experiment, how should Full Rich View (and later revert to calling it the Rich View) respond to the Fragment View? As mentioned earlier, Kouider et al. have proposed a seemingly reasonable explanation for the "erroneous reporting performance": subjects are only conscious of the fragments, which does not support a rich phenomenology. Unlike Block's passive response strategy, we will argue that Kouider et al. have overlooked an alternative explanation for their new data.

3.2 Possibility of Rich View's Compatibility with New Data

Consider the following possibility that Kouider et al. may have overlooked: even if we accept the Rich View, which posits that subjects are indeed conscious of the specific letter-shape representations, could there be other factors leading to their erroneous reporting performance?

In other words, even though Kouider et al. may claim that it seems impossible to directly establish a relationship between the Rich View and the erroneous reporting performance — the Rich View seems unable to account for the subjects' erroneous reporting performance — this *does not imply* that the Rich View is incompatible with subjects' erroneous reporting performance. As long as it can be shown that *OTHER factors lead to* the erroneous reporting performance *while remaining COMPATIBLE with the Rich View*, it will *indirectly* weaken the validity of the Fragment View and support the Rich View.

One concern is that, given the Fragment View already seems to provide a reasonable explanation, there appears to be little motivation to seek a competing explanation that could reconcile the Rich View with the erroneous reporting performance. It is also difficult to understand why, after seeking this explanation, the Fragment View would be weakened and the Rich View supported. This is not the case; this seeking work is well-motivated. The motivation will be presented below. To begin with, I will introduce the Rich View and the Fragment View, which respectively reject and support the gatekeeper view—the idea that attention is necessary for consciousness. After presenting experimental evidence both for and against the gatekeeper view, I will make two points.

First, I will show that the latest experimental evidence still favors rejecting the gatekeeper view. Second, I will argue that the Fragment View faces a theoretical dilemma. Overall, the Rich View has a theoretical advantage.

3.3 The Motivation for Seeking a New Explanation

Currently, there are three positions on how to describe the information in iconic memory: Position A suggests that the information is unconscious; Position B suggests that only fragmented information is conscious, lacking consciousness of full information; and Position C suggests that the full information is conscious and highly specific. The Generic View (though it is not the focus of this paper) supports Position A, the Fragment View corresponds to Position B, and the Rich View corresponds to Position C. Positions A and B[5] propose that attention is the gatekeeper to consciousness and that information requires attention to enter consciousness, whereas Position C rejects this idea. Both Position B and Position C agree that consciousness is rich in content. However, Position B proposes that this richness does not exceed accessibility, while Position C holds that it does (Wayne Wu, 2014, pp. 189-190).

To restate, the Rich View rejects the gatekeeper view, whereas the Fragment View supports it. As we will see, although experimental evidence supporting both sides has evolved over the past few decades, the latest findings still seem to favor rejecting the gatekeeper view.

For clarity, let's start with the early evidence supporting the gatekeeper view. Rensink et al. (1997) found that interruptions in visual continuity made participants miss changes, like a jet engine appearing on a runway. Mack & Rock (1998) showed that focused attention on another task could cause participants to overlook even prominent stimuli. Simons & Chabris (1999) confirmed this with their famous gorilla experiment, where about 50% of participants, counting ball passes, failed to notice a person in a gorilla suit. These studies suggest that attention is necessary for consciousness, supporting the gatekeeper view.

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[5] Kouider et al. (2010, p.304) stated: "the possibility of consciousness without attention is usually based on a restrictive definition that does not take into account the possibility of residual attention at lower (i.e., sensory, non-conceptual) levels of processing." In their experiments, even when subjects were asked to report the content of the cued row and most of their attention was focused on it, the uncued row still received a particularly limited amount of attention, allowing subjects to access only partial representations of those features. Wu (2014, pp.206-207) also argued that Kouider et al. hold the gatekeeper view. Block (2011, p.568) similarly pointed out that Kouider et al. hold this view.

Many studies have been cited to challenge the gatekeeper view. Lamme (2003), in a theoretical review, interprets a range of empirical findings to argue that visual consciousness depends on recurrent processing rather than attention. For instance, in change blindness paradigms, participants could report changes when retroactively cued (Landman et al., 2003); in masking studies, stimuli that went undetected still elicited selective neural responses (Enns & Di Lollo, 2000; Lamme et al., 2002); and TMS studies showed that disrupting recurrent processing eliminated conscious perception of visible stimuli (Walsh & Cowey, 1998; Pascual-Leone & Walsh, 2001). Drawing on these and other findings, Lamme argues that while access consciousness may require attention, phenomenal consciousness can occur independently of it.

Similarly, Koch and Tsuchiya (2007) cited several studies to argue that attention and consciousness are distinct processes. For example, they referenced Li et al. (2002), which showed that subjects could rapidly grasp the gist of peripheral scenes even when attention was focused elsewhere, suggesting that conscious experience can occur with minimal top-down attention. They also cited studies by He et al. (1996) and Montaser-Kouhsari and Rajimehr (2004), which found that attention can be directed toward unconscious stimuli without generating conscious experience. In addition, drawing on findings from Suzuki and Grabowecky (2003), they noted that reducing attention during adaptation can enhance negative afterimages, implying that attention and consciousness may even have opposing effects. Taken together, Koch and Tsuchiya interpreted these studies as supporting the view that attention and consciousness rely on distinct neural mechanisms.

Bronfman et al. (2014) later showed that participants could accurately estimate the color diversity of items outside the focus of attention, without any cost to their performance on a central letter-report task. Because such diversity judgments require a fleeting but differentiated representation of individual colors, this finding suggests that participants had genuine, though short-lived, color phenomenality even for unattended regions. Kozuch (2019) integrates phenomenological intuitions with classical experimental data, such as the gorilla experiment, to argue that, even when participants fail to report seeing a target object (e.g., the gorilla), the object may still appear in their central visual field, an area typically associated with color experience. He suggests that participants likely experienced the color of the unattended object, despite not attending to it. According to Kozuch, phenomena like inattentional blindness and change blindness not only fall short of supporting the Necessity Thesis (i.e., the gatekeeper view), but may in fact count against it.

However, this does not mean that the gatekeeper view cannot be supported. Sergent et al. (2011) found that within a critical time window after a visual stimulus disappears (about 200 msec), top-down signals from higher cortical areas can still modulate early visual regions such as V1 and V2, and predict whether the stimulus reaches conscious awareness. Moreover, conscious perception of 'gist' information, which was once thought to be independent of attention (e.g., Bronfman, 2014), may in fact depend on it (Cohen et al., 2011b; Mack et al., 2012, 2015; Jackson-Nielsen et al., 2017). For example, Jackson-Nielsen et al. (2017) conducted a series of experiments showing that conscious perception of ensemble statistics requires attentional resources. In inattentional blindness paradigms, when participants focused on a primary letter-report task, most failed to notice changes in ensemble features—such as color or size diversity—in unattended regions. Under dual-task conditions, performance on the primary task declined significantly, suggesting that extracting ensemble features consumes limited attentional capacity. Even with explicit training to judge these features, participants frequently failed to detect them when their attention was otherwise occupied. Taken together, these findings suggest that, although ensemble statistics may be processed efficiently, their conscious access requires at least some degree of attention.

Cohen et al. (2020) used immersive virtual reality to study color awareness during naturalistic vision. They found that when participants freely explored 360° scenes, many failed to notice when most of the peripheral visual field was desaturated. When participants were instructed to attend carefully to the periphery, their sensitivity to color loss improved, but large portions of the visual world still went unnoticed. Although the visual system can encode color information across the field, conscious experience of peripheral color strongly depends on attention and remains surprisingly limited, even under directed conditions. This can also be used to support the gatekeeper view.

Despite this, a recent experimental study still tends to reject the gatekeeper view. Nartker and Phillips et al. (2024, pp. 4–12) found that even under inattentional blindness conditions, participants who claimed not to have noticed a stimulus were still able to report stimulus-related information with above-chance accuracy in a subsequent forced-choice test. This suggests that traditional inattentional blindness studies may underestimate participants' actual perceptual abilities. Moreover, the study found that participants tend to adopt a conservative criterion when judging whether they noticed a stimulus, often defaulting to “I didn’t notice” when uncertain. This implies that inattentional blindness may not reflect a complete lack of awareness but rather a degraded state of consciousness, which tends to further reject the gatekeeper view.

However, given that the experimental findings on this topic are constantly evolving, as seen in the history of iterations above, we don’t intend to stop here. Second, instead, we will emphasize that the Fragment View has placed itself in a dialectical dilemma, losing its simplicity compared to the Rich View.

What was Kouider et al.’s objective in postulating fragmented phenomenology? The aim was to dispel the intuition that consciousness is rich beyond the focus of attention by positing low-detail representations—sufficient to create the illusion of perceptual richness, even if the underlying phenomenology remains sparse. At the same time, as a gatekeeper theorist, he seeks to uphold the view that there is no phenomenology without attention. However, this strategy faces a dilemma—it cannot have it both ways.

Either these fragmented representations are consciously experienced without attention, or they require attention to become conscious. If they don’t require attention, then the gatekeeper view is wrong because that would mean consciousness can occur without attention and thus without cognitive access. This is not what Kouider et al. intended. As Kouider et al. (2010) claimed, content outside the focus of attention is not entirely unattended; rather, it receives only limited attention, resulting in mere conscious fragments.

If they do require attention, then two problems arise. First, if attention is required for these fragments to become conscious, it is unclear how they could create the illusion of perceptual richness beyond the focus of attention. Second, if these fragmented representations are accessed, I should be aware that my visual experience is, in fact, sparse. If it were truly the case that my phenomenology is constituted by accessed, poorly detailed representations, I should not be surprised when I fail an inattentional blindness task. After all, I should be aware that my conscious experiences lack detail. However, empirical evidence shows that naïve observers are often surprised by phenomena such as inattentional blindness and believe that their phenomenology is rich (Levin & Angelone, 2008). Therefore, the Rich View is more concise and preferable, as it directly explains why people believe their experience beyond the focus of attention is rich. In contrast, the Fragment View fails to provide a clear explanation.

So, if evidence can be found that is compatible with the Rich View and the erroneous reporting performance of subjects, the Rich View can still maintain its reasonable superior position. Then, *could there be other factors* leading to their erroneous reporting performance, such that we can simultaneously accommodate both the Rich View and the erroneous reporting performance? I will now introduce potential evidence.

4 An Alternative Explanation

Consider the text "Does the human mind raed wrods as a whole?" You might notice that some words have letters in the wrong order when you read them carefully, or you might not notice the jumbled letters if you quickly glance at them. If you enjoy reading, you might be familiar with and easily accept a common phenomenon: in most cases, when quickly reading complex text, native speakers, whether in English or other languages, might overlook the slightly jumbled letter order within a word. Despite this, they can effortlessly read the text. The brain seems to automatically help correct the letter order errors in certain situations, ensuring smooth reading without you even being aware of it. This phenomenon, demonstrated by Grainger and Whitney (2004) and others, has sparked attention and discussion.

In recent developments exploring this phenomenon, the focus involves the localization of neural mechanisms for letter coding and subsequent lexical decision-making. The lateral occipital (LO) region, involved in visual processing, uses a configurational code to represent each string. Decisions about strings must involve comparing word representations stored in the so-called visual word form area (VWFA), and its activation is linked to the timing of subsequent string decisions (Agrawal et al., 2020).

This phenomenon can also be described as an illusion. In Kouider et al.'s experiment, subjects might consciously experience the entire matrix content, but *only at the level* of low-level visual features—basic letter shapes, edges, curves, etc.—rather than as letters. Experiencing them as letters requires *categorizing* them as such, which may require attention. Once attention is directed to them, they are experienced as letters and so as non-rotated—making it a genuine illusion. The categorization process operates as follows: the subject first perceives low-level features, which are subsequently compared with stored letter representations in the internal alphabet, situated at a higher level in the visual hierarchy.

In greater detail, due to attentional constraints (as noted in footnote 6) —given that the rotated letter is in a non-cued row—subjects can access only partial geometrical fragments of the aforementioned low-level visual features (i.e., specific letter shapes) when reporting. Before the final report, these fragments are first encoded in the LO. Although the LO is known for processing coherent object shapes (Malach et al., 1995; Grill-Spector et al., 1998), evidence shows that it can also encode shape fragments in some cases (Grill-Spector et al., 2009, p.1415). These encoded fragments are then used to retrieve and match stored, learned letter representations in the VWFA. The categorization process concludes at this stage. The letter that subjects ultimately report is the one that has been matched and categorized within the VWFA, specifically, the real letter corresponding to the rotated letter. For instance, the best match for a rotated "R" remains "R." In sum, subjects may consciously experience the low-level visual features that *constitute* the letters. This aligns with their tendency to report rotated letters as real letters, as the report is contingent on how individuals categorize the letters.

If subjects receive attentional assistance from cues, they can access the specific letter-shape representation of the letters in that row and utilize it in the retrieval and matching process within the VWFA. With attentional assistance, subjects can distinctly compare the specific representation with the pre-existing representations within the VWFA. Therefore, it is reasonable to argue that, at this point, the subjects would not experience the so-called illusion when reporting the letters in the cued row. They would assert that what they see is a rotated letter rather than the corresponding real letter.

It is noteworthy that in this experiment, even if subjects are fully aware that their perception may be misleading, the erroneous performance — reporting the rotated letter as the corresponding real letter — persists. This directly suggests the likely existence of a mechanism beyond the subjective control of the subjects (de Gardelle et al., 2009, 577). This automatic mechanism leads subjects to make errors in reporting, even when they are aware that their perception is misleading, a pattern very similar to the behavior of the LO-VWFA mechanism. Other data reported by Kouider et al. align with the findings of Agrawal et al., as their experiments demonstrate that the fragment illusion may arise from the interaction between perceptual difficulty and prior strength:

> *"According to us, this effect results from the interaction between perceptual difficulty and the strength of priors: the poorer the evidence, the more the elaboration*

of the percept will depend on priors. Priors can be depicted as strong internal representations and/or context-dependent expectations acting as attractors that bias perceptual mechanisms (e.g., Summerfield & Koechlin, 2008). This process usually benefits the observer, as it allows for observers to make fast decisions on complex but ecologically relevant visual stimuli (Thorpe, Fize, & Marlot, 1996). Here, letters probably benefited from high relevance caused by strong expertise developed by years of reading. Thus, as subjects are biased towards treating letter-like symbols as real letters, they illusorily perceived rotated letters as their upright counterparts." (de Gardelle et al., 2009, p. 576)

The poorer perceptual evidence reflects the fragmented representations encoded within the LO region. In Kouider et al.'s experiment, due to the limited attention of the subjects to the uncued row (leading to higher perceptual difficulty for the content in that uncued row), they could only cognitively access and encode the (poorer) fragmented representations of the rotated letters, which are encoded within the LO region. The strength of priors reflects the quantity of representations already stored within the VWFA. The fragmented representations are matched with the representations within the VWFA, matching the representations of the corresponding real letters, which are then reported by the subjects.

To summarize, the introduced LO-VWFA mechanism allows the Rich View to plausibly explain the new data previously attributed to the Fragment View, specifically the subjects' erroneous reporting performance. The Fragment View interprets this erroneous reporting as a consequence of subjects being conscious of fragmented representations of letters in the matrix. However, the LO-VWFA mechanism shows that, even though subjects are conscious of specific letter-shape representations, erroneous reporting performance still may occur. While Kouider et al. might contend that the LO-VWFA mechanism could also align with the Fragment View, this falls outside the scope of our discussion. This paper does not directly argue that the Fragment View is incorrect; rather, it challenges the uniqueness of its interpretation of the new data and effectively integrates the Rich View with this new data. As mentioned in Section 3.3, the Rich View has theoretical advantages over the Fragment View. Since the Rich View can also reasonably account for the new data, it remains superior to the Fragment View.

One possible counterargument is that Agrawal et al.'s research addresses only the phenomenon of jumbled-word illusions caused by the rearrangement of letters within words without covering the fragmented letter illusion phenomenon observed in Kouider et al.'s experiment. The latter involves illusions induced by inverting the shapes of individual letters, a fundamentally different phenomenon from the former's focus on word forms.

However, letters themselves can also be considered a form of a word—not all words necessarily consist of more than one letter; they can also be composed of a single letter. For example, the letter "A" not only functions as a Greek letter but can also serve as an English word, representing "not any particular or certain one of a class or group." This implies that within the VWFA, there exist numerous representations of individually learned letters, such as the letter "R" involved in Kouider et al.'s experiment. Interestingly, Kouider et al. seemed to have considered this issue as early as 2004. Although they made a distinction between the two, they certainly did not refute the possibility of treating them equivalently and appeared to have a positive attitude towards it (Kouider and Dupoux, 2004).

One might worry whether the LO-VWFA mechanism is compatible with the format requirements of phenomenal consciousness, which, as traditionally argued by overflow theorists, has a very particular mental format: iconic, non-propositional, and non-conceptual. I need to clarify that the LO-VWFA mechanism occurs after cognitive access, not before. As mentioned earlier, it is quite possible that a small part of the subjects' attention 'escaped' to the uncued row. Thanks to this limited attention, fragmented representations of the rotated letters could enter the working memory system for cognitive access. Then, however, because subjects only have accessed fragmented representations, after undergoing the automatic contrast process of the LO-VWFA mechanism, they can only report the corresponding real letters. According to this, the operation of the LO-VWFA mechanism does not impose any special requirements on the format of phenomenal consciousness as traditionally argued by overflow theorists. There may be much debate about the format of phenomenal consciousness, but this is beyond the scope of this paper (Block 2023, Chapter 4).

Let's turn to the next concern. Subjects are conscious of the specific letter-shape of these rotated letters, yet they report the rotated letter as the corresponding real letter due to the operation of the LO-VWFA mechanism, which seems to suggest that this mechanism does not operate when attention is focused on the letter. However, when we read texts in daily life, even if the reader's attention is focused on each letter, they still overlook scrambled words, indicating that the LO-VWFA mechanism is still operating. Here, there seems to be an inconsistency: why does the LO-VWFA mechanism not operate for subjects in Kouider et al.'s experiment when attention is focused on the letter, but it does operate for everyday readers?

Again, when subjects are asked to focus their attention on the cued area in the report, their attention is still likely to "escape" a small portion into the uncued rows. Due to this limited attention, the representation of fragments of the rotated letters in the uncued rows enters the working memory space for cognitive access. However, because subjects only access the fragments, after undergoing the automatic comparison process of the LO-VWFA mechanism, they can only report the corresponding real letters. In contrast, when attention is fully drawn to the letter, their letter-shape representation is specific. This specific representation, when undergoing comparison within the LO-VWFA mechanism, will correctly match the existing representations within the VWFA. Therefore, it is not that the LO-VWFA mechanism is inoperative, but rather that the representation of the letter coded within the LO region is complete at this time, preventing incorrect matches within the VWFA mechanism.

But there is indeed a phenomenon: when our attention is drawn to the letters, we still overlook scrambled words. This requires us to distinguish between attention drawn to the letters and attention drawn to the whole word. In the former, the focus is on the letters, while in the latter, the focus is not only on the letters, but also on the whole word itself. By making this distinction, we can reasonably further understand why when our attention is drawn to the letters, we still overlook scrambled words.

According to the relative-position coding scheme (Agrawal et al., 2020, e54846), when we visually read a word with scrambled letters, if the positions of the letters in the scrambled word are more similar to the corresponding normal word, it is more likely to be misread as the corresponding normal word. For example, let's consider the words OFREGT, FOGRET, and FORGET. Compared to OFREGT, subjects are more likely to perceive FOGRET as FORGET because the arrangement of letters in FOGRET is closer to FORGET than that in OFREGT. For, when subjects focus only on a single letter, the LO region has already coded these specific letter-shape representations; whereas when subjects focus on the letters within a word, the LO region has *only* coded these specific letter-shape representations in this word but has not necessarily coded the representation of the word as a *whole*, the whole-word representation contains not only specific letter-shape representations but also possibly positional information about the arrangement of the letters. This enables us to understand why, when our attention is focused on the letters, the LO-VWFA mechanism still causes us to overlook scrambled words.

One final possible concern is about the location where the conscious experience of specific letter-shape representations occurs. As explained earlier, this paper does not claim that the LO-VWFA mechanism is responsible for this experience. Instead, it argues that the mechanism operates after cognitive access. However, if we assume that the conscious experience of letter shapes does not arise from the LO area or the VWFA, someone might ask: where does the conscious experience of these specific letter-shape representations come from?

The motivation for this concern is that LO has long been one of the most obvious candidates for supplying such shape experiences. It plays an important role in conscious shape perception, as supported by the case of patient DF, who lost shape experience following bilateral LO damage, and is widely regarded as a mid-level visual area responsible for representing whole object shapes, likely including letters (Whitwell et al., 2015). If LO is excluded, then it is unclear which other visual area would be well-suited to represent full and specific letter-like forms in a way that supports the phenomenal experience of letter shapes. Although the VWFA is also involved in letter processing, its function lies in identifying letter identities. So, if the experience in question is not one of perceiving letters *as letters*, but rather of experiencing their fine-grained letter shapes, then the VWFA also does not seem well-suited to serve as the neural basis for such experience. If no other plausible candidates remain, would this render the Rich View neuroscientifically implausible?

We acknowledge that LO, as a mid-level visual area, plays an important role in conscious shape perception. For example, the loss of shape experience following bilateral LO damage in patient DF clearly indicates the necessity of LO for shape perception. However, it is important to emphasize that neural deficits reveal necessity, not origin: that a brain area is necessary for a function does not directly imply that it is the site where conscious experience is generated. Thus, although LO is crucial for shape experience, it does not entail that conscious specific letter-shape representation itself originates in LO.

Existing research (e.g., Pasupathy and Connor, 2001) has shown that area V4 also possesses the capacity to represent complex shapes. Although V4 is often associated with color processing, it shows significant potential for complex shape representation, and it is also closely linked to neural hypotheses of phenomenal consciousness. For instance, studies by Landman et al. (2003), Lamme (2003), and Sligte et al. (2010) suggest that phenomenal consciousness primarily depends on posterior visual areas (such as V4) rather than on the dorsolateral prefrontal cortex (DLPFC).

We do not claim that V4 is definitively the neural basis of the conscious experience of letter shapes. Indeed, any attempt to identify the exact neural basis of consciousness is extremely complex and beyond the scope of our discussion. Rather, our point is that not committing to LO as the locus of consciousness does not leave us without viable alternatives. At minimum, V4—an upstream mid-level area relative to LO—remains a reasonable candidate. Thus, even without committing to LO as the neural basis of letter shape experience, the Rich View remains neuroscientifically plausible.

To reiterate, the LO-VWFA mechanism introduced in this section enables the Rich View to reasonably accommodate the new data relied upon by the Fragment View—specifically, the subjects' erroneous reporting performance. This is not a direct refutation of the Fragment View but a challenge to its claim of the uniqueness of being the explanation of the new data. In Section 3.3, we have already emphasized the theoretical advantages of the Rich View over the Fragment View. Given that the Fragment View's exclusivity has been challenged and the Rich View can still reasonably account for the new data, it remains superior. The final part of this section addresses potential concerns, and these responses aim to further illustrate the reasonableness of the LO-VWFA mechanism in supporting the compatibility between the Rich View and the new data.

5 Conclusion

Kouider et al. proposed the Fragment View based on new data from the Sperling variant experiment. They claim that subjects are conscious only of fragmented representations of iconic memory content rather than the specific ones. This stands in contrast to the Rich View, which asserts that subjects are conscious of the specific representations. Kouider et al. insist that only the Fragment View can properly explain the new data, while the Rich View supposedly cannot.

However, this paper challenges the idea of the uniqueness of the Fragment View as the currently available explanation for these new data, arguing that Kouider et al. have overlooked alternative explanations. By introducing the LO-VWFA mechanism, it becomes clear that although the Rich View may not directly account for the new data, these data can be explained by the LO-

VWFA mechanism, which is compatible with the Rich View. Additionally, the Rich View holds theoretical advantages. The latest neuroscience evidence supports the Rich View, and the Fragment View also faces its dilemmas.

In conclusion, the Rich View not only accounts for the data on which the Fragment View relies but also holds greater theoretical advantages than the Fragment View. There remains good reason to maintain confidence in the Rich View, as the Fragment View does not appear to pose a serious threat to it.

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