A qualitative evaluation of narrative analysis in fiction writing

Joseph Reddington
Royal Holloway.
University of London.
joseph@cs.rhul.ac.uk

Douglas Cowie
Royal Holloway.
University of London.
Douglas.Cowie@rhul.ac.uk

Fionn Murtagh
Royal Holloway.
University of London.
fmurtagh@acm.org

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Abstract
Since the personal computing revolution first brought computers into the home, there have been a plethora of tools to help writers produce narratives. Spell-checking, word counts, readability analysis, and version control give today's novelists tools that Dickens, Austen, and Shakespeare could only have dreamt of. However, such tools have focused on the word (spell-checking), or phrase (grammar checking, Flesch-Kincaid readability tests) levels. In the last decade, research focus has shifted to more support for collaborative editing of documents, but any tool that seeks to visualise, let alone modify, the themes or structure of a creative work is viewed with deep suspicion by the writing community. This work considers more sophisticated attempts to visualise pace and rhythm within a narrative and analyses the application of two visualisation tools in several domains. The key insight of this project is that these visualisations, although created by an absolutely objective process, can be interpreted subjectively in the same way that the original text can be.

Introduction
This work considers more sophisticated attempts to visualise pace and rhythm within a narrative. The key insight of these techniques is not to replace a qualitative evaluation (the reading of the text) with a quantitive assessment, but, by means of a rigorous deterministic

process, to extract relationships from input data and display them for interpretation. In essence, one qualitative evaluation (of the text) is augmented with another (of an image); however, the qualitative evaluation of the image has the advantage that it is not only vastly faster, but also independent of both language and reader familiarity.

Fiction writing is a competitive industry, and supports several sub-industries in the form of writing classes, manuscript consultants, and networking events. Since writing is a subjective art form at anything but the most basic level, writers face challenges in getting feedback on their work, particularly in terms of rhythm and pace. Not only is the quality subjective, the process is extremely time-consuming for the reader. Moreover, if the writer is to iterate through drafts of their work, then the feedback of any given reader becomes less and less useful as the reader becomes more familiar with the text. There are also situational difficulties, such as if the writer simply doesn't accept aspects of the criticism as valid.

A naïve tool might split a narrative into chapters and then plot a chart showing how a measure like the Flesch reading index [Fle48] changed between chapters. Such a chart would have limited general use; however, if a chapter had a significantly different index it would be sensible to conclude that the chapter was considerably different in style to the surrounding chapters and that the writer should be aware of this. A key point here is that the writer certainly shouldn't be expected to change the narrative simply because one chapter is somewhat unusual by some measure. There are many possible sensible reasons for the anomaly, but it is our position that it is to the writer's advantage that they are aware of both the result and the tool, so they can reason about why the result occurred. If the writer has purposely caused the effect to further the narrative, then such a result would be a validation, otherwise, if the writer has accidentally caused the effect then they can consider the worth of the effect and potentially take steps to adjust or remove it.

This work uses a framework for narrative analysis proposed in [MGM09] and applies such techniques to two example domains, with a view to evaluating the system to see if it can provide insights of value in literary research. One domain is in the traditional agent/consultant model, whereas the other is a group process, situated much closer to writing for TV or film scripts.

This paper first details work in related areas and places the techniques examined here in an insightful and innovative context. Following sections describe the evaluation domains before each visualisation is separately described. The analysis of each visualisation is accompanied by examples and notes on how the use was suited, or not, to particular aspects of each domain. The paper concludes with discussion and an agenda for future research.

Previous Work

Previous work relating narrative and computer science tends to focus on creation - for example, designing systems that produce 'emergent narrative' [KA08, LSKA08, CL02] or by modelling an existing narrative as a sequence of actions with pre and postconditions [PCC10]. There are also many instances where media outlets have announced computer systems that can 'pick' the the next bestselling book, script, or music [She10] - the failure of these systems to live up to the hype has led people to be naturally cautious about any analysis system in the creative domains.

The techniques examined in this paper were first used in [MGM09] to distinguish the style and structure of film

> We have since started to make this analysis a permanent part of our editorial procedure, with suitable submissions (both short stories and full novels) being forwarded to the team for analysis while we edit the work. This then allows us to review the analysis report alongside our own editorial reports.
> Over the short time we have been using this tool, we have found that a large percentage of these analysis reports, in editorial terms of the work, match our own, therefore strengthening our own editorial feedback to our authors.
>
> . . .
>
> Overall, we at The Writer's Desk have found this analysis to be of a great assistance to our editorial work in all aspects of the editorial process. From helping to identify target markets, to highlighting problem areas within the novel, to illustrating writing style, these analysis reports have become a rather important part of our working operative. We would like to thank the work of the team on the documents we have sent them for analysis, and we would highly recommend this tool to any of our editorial and publishing counterparts.

Figure 1: Extract from TWD testimonial

scripts. Murtagh et al focused on capturing the semantics of the data and the plausibility of taking text as a practical and useful expression of underlying story. This work can be characterised as providing a platform to construct visual representations of the semantics encoded in the data. It was used in [MG10] to examine variants of the Lady Maisry ballad.

There is some overlap with the nearby area of *sentiment analysis* (SA), which analyses user-generated online content - often by determining if the author of a given blog comment or tweet is in favour of, or against, a commercial product. Although visualisations have been constructed this way [KGK11, GACOR05, CIsSW06], such approaches are based, thus far, in examining a small set of 'sentiment bearing' words, and consider the source text as a single block, rather than a set of discrete scenes comprising a narrative arc.

Methodology and Evaluation Domain

A number of interviews were conduced with experts in the publishing industry that made it clear that there was a large degree of resistance to what the industry might see as 'replacement by robots'. The two visualisation techniques we evaluate here are of interest because they require a level of interpretation from the user, and so may be much more acceptable to the industry.

The use of these techniques were evaluated in two domains, which were selected to represent the extremes of creative writing. 'The Writer's Desk' is a consultancy offering a very traditional feedback mechanism to authors, whereas 'Project TooManyCooks', much more models the deadline-driven high intensity creativity found in group writing for TV, film, or magazines.

This section presents details of two domains studied in this work. Later sections will evaluate how different visualisation methods might be used to enhance the workflow of each. Our evaluation is based both on our observation and testimonials such as Figure 1.

Project TooManyCooks
Project TooManyCooks (TMC) (described briefly in [**?**]) is a creative writing project that runs 'camps' of 8 to 10 student writers who collaboratively create a novel (depending on the age of the students this is normally in the 30,000 to 65,000 word range) over a period of five days. It has two core goals: to increase the contact time and feedback between students interested in fiction writing; and to give students experience of the lifecycle of the novel from inception to printing. Example outputs include [Coo12b, Coo09, Coo11, Coo12a]. In this domain, users were particularly interested in using the analysis techniques to quickly alert them to sections that in some sense didn't follow the overall voice of the rest of the novel. The project was also interested in visualisation of overall plot arcs - allowing them to reorder sections in such a way that particular scenes do not overshadow each other within the narrative.

The Writer's Desk
'The Writer's Desk' (TWD) is a commercial entity specialising in the review of manuscripts for authors [Kib12]. Their role is in giving professional feedback to authors over the style and structure of their work. This study spent six months providing narrative analysis for a selection of the submissions they received. The analysis reports were either used internally for developing TWD feedback or passed on to authors as an appendix[1]. TWD and their writers were particularly

[1] An example of a report prepared for TWD is at http://www.cs.rhul.ac.uk/home/joseph/hosted/angel.pdf

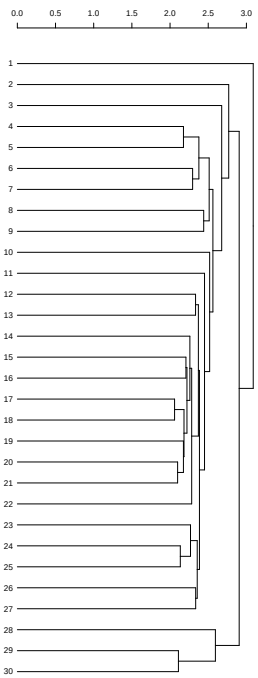

Figure 2: Ordered visualisation of chapters in 'Harry Potter and the Half-Blood Prince'

interested in seeing the chapter-to-chapter flow and, as an extension of this - how an author's work sits as a whole, in terms of how chapters interlink. As a commercial enterprise, TWD was also interested in identifying target markets - and in grooming submissions to hit an area of particular interest to the public more precisely.

Visualisations

This work reports experiences using two visualisations built from the same *kernel*, the creation of which is briefly described below. Each input text is automatically divided into a number of segments, with chapter headings being used to delimit segments[2]. Given these segments and a list of unique words in the input text, a cross-tabulation is constructed which gives the count of the occurrences of a given word in a given segment. From a machine-learning perspective our data was semi-structured, in that it is organised into discrete chapters or segments. One can use correspondence analysis to extract from a crosstabulation some level of structure from the text in the form of an embedding in Euclidean space. Details of the construction are beyond the scope of this work, but are available in [MGR10, MGM09]. This work refers to the extracted structure as the *kernel* of the text. Both the visualisations presented use this kernel as a starting point. For each visualisation, a description is given with examples and then a detailed analysis is given of the advantages and disadvantages of the visualisation in each domain.

Unordered

This kernel can be projected into two dimensions to show the relative position of each chapter in the projection. Figure 3 shows such a projection from 'Owen Noone and the Marauder' [Cow05], with each segment of the text represented by a point on the projection. Since the process used the relative word counts as its starting point, two segments in the novel will appear closer to each other in the projection if they have similar relative word frequencies. It is our position that when an author writes a segment in a distinctly different style or tone (major examples might be moving to a different tense or a sudden change in the tension in the storyline) then these word frequencies will change significantly and be visible on the projection for interpretation.

[2] If there are no chapters in the text, but sections are divided by some distinct typographical convention, then section boundaries may be used instead.

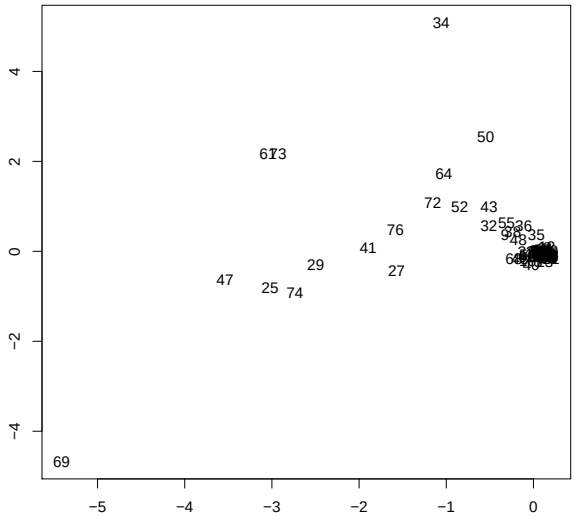

Figure 3: 'Owen Noone and the Marauder' as an unordered visualisation

USA Today, November 4, 1998:
California: NOONE SQUEAKS IN.
Los Angeles-In the most public and bizarre Senatorial race in the country, Republican Jack Noone edged out his Democrat opponent Benjamin Steffens by just a 3% margin.
At his victory rally, Senator-elect Noone congratulated his opponent on running a clean, issue-based campaign before going on to say, "Tonight represents a victory not just for me, not just for the Republicans, not just for the State of California, but for the moral causes that I have so strongly defended and promoted."
Mr. Noone's campaign was fraught with controversy, most notably the constant accusations made by his estranged son, the rock musician Owen Noone. Asked about his son, Mr. Noone stated, "Owen and I still have some things to reconcile, but I hope and pray and am confident that in the coming months we will come to a better understanding of each other."

Figure 4: Extract from 'Owen Noone and the Marauder'

For example, Figure 3 shows a tight core grouping over to the right hand side of the projection, with a number of outliers. Subjectively one might say that this grouping represents the 'voice' of the author or novel - and it may be considered worthwhile to investigate the nature of those segments that did not fit in with this voice. If one examines segment 69, shown in Figure 4, which is the most extreme outlier, it can been seen that it is written as a fictional extract from the newspaper *USA Today* - as opposed to the majority of the novel, which is written with a more conventional third-person narrator. The author very much intended to give this segment a different 'voice'. In this particular work, the majority of the other outliers are similar plot devices in the form of radio announcements, magazine articles and so on. Of course, the software makes no judgement here - it simply displays the information for an expert evaluation.

The example of Owen Noone is a static study of a published novel after a rigorous proofing and editing process. The following sections show how TWD used the visualisation to examine a 'snapshot' of styles to position a novel in the market, while TMC used the visualisation to track the progress of construction over time.

TooManyCooks
One of the core goals within the TooManyCooks process was to give the appearance of having one single author with a clear style and 'voice'. The group originally relied on the 'wikipedia effect' - that is that if enough different authors proofread and rewrite the same section repeatedly, then differences in style become invisible to the causal reader. However the two dimensional projection allowed users to visualise the style and see which sections might benefit from a stylistic rewrite.

It is tempting to assume that this 'core style' was simply the average of the styles of the writers. In fact, this was the working model used in TwoManyCooks - this visualisation was introduced in the proofreading stages as a way of applying a consistent style across the novel. Group co-ordinators would identify outliers - evaluate each of them to see if the outlier was an 'intentional outlier' and if not, paired it with another segment that was in some sense opposing the first. The group members who wrote the first drafts of each of these were instructed to copyedit each other's draft with the intention that the stylistic differences would cancel out. One could imagine a similar process pairing writers and subeditors on a magazine or a newspaper.

In fact, later work casts some doubt on this model. A recent TooManyCooks group was selected from students who had won a short story competition - Figure 6 shows a projection in which the short stories are compared with both the novel that the writers produced, and (for context) the popular novels 'Harry Potter and the Half Blood Prince' [Row05], represented by 'H', and 'Pride and Prejudice'[Aus12], represented by P. The short stories (represented by the 'I' symbols) are unquestionably closer in style to each other than the resultant novel (represented by 'S' symbols) - suggesting that in fact the core clustering is more a result of the group of writers improving the consistency of their prose with regard to an intended style, rather than being shackled to a literary 'fingerprint'. Note also that the clustering of the TooManyCooks novel is much less tight than either of the two popular authors, which is probably to be expected from a small group of 6th-form students[3] writing over a five day period.

The major use of the unordered visualisation for the

[3] 16-17 years old

The analysis reports were also perfect in identifying the market for those novels we sent for analysis. By instantly being able to identify the market for these novels, it helps the author target their submissions more accurately to publishers and agents, and then likewise would allow agents to target suitable publishers with independent back up that this market is where the novel belongs. By being able to identify a specific market for a novel it would help the agent and publisher save up to 60% of their time that is usually spent on rejecting submissions purely on the basis that they are not suitable for the given market.

Figure 5: Extract from TWD testimonial

TooManyCooks project was in identifying sections of unusual style and being able to evaluate each for its role in the story - being able to highlight those aspects of the story that did not have the same 'voice' as the main narrative allowed the writers to streamline the feedback process and present to readers a more consistent narrative.

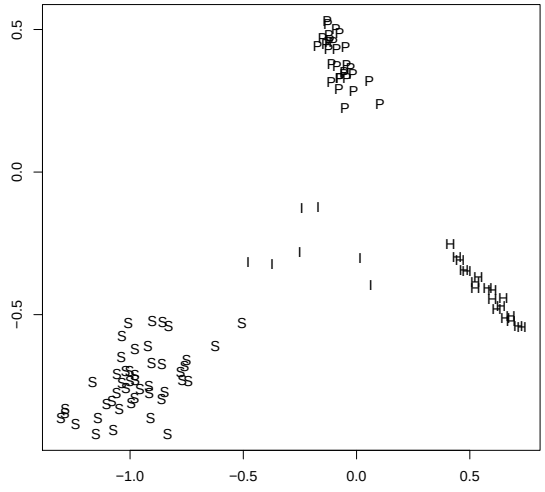

Figure 6: Comparing author short stories (I) with their collaborative novel (S) and commercial examples (H&P)

The Writer's Desk (TWD)

A major attraction of the projections within the TWD domain was the ability to quickly compare with other artists within the same genre. A regular complaint of publishers and agents is that they are sent manuscripts for genres in which they do not specialise and end up rejecting the vast majority of these out of hand. At the fine-grained level, editors have regularly commented that an author does not necessarily write in the style that they believe they do and, more crucially, they do not necessarily aim at a market segment that they are best suited for. By using the projection visualisation to compare a target manuscript with a selection of commercial novels one can compare explicitly.

For example, TWD had a commission to examine a particular target novel that was aimed at the style of romance novel exemplified by Danellie Steel. Figure 8 shows the the target novel text (T), compared with several other novels. These are: Kaleidoscope, by Danellie Steele (S); Emma, by Jane Austen (A); and Eclipse, by Stephanie Meyer (M) [Ste88, Aus15, Mey07]. This allowed TWD to evaluate, to their own satisfaction, if the style and word choice in this instance was closer to the Steele-style romance than either the classic or teen styles of the other examples. Furthermore, the overall consistency of the text is similar to what would be expected from a published novel. There is, of course, a psychological component to some of this feedback. Some authors react viscerally to the idea of this sort of analysis, fearing that the approach reduces creativity, while some react very favourably, having more faith in their own interpretation of the visualisations than they necessarily have in their agents or editors (who they might see as sparing them 'hard truths').

The ability to highlight anomalous sections was also of great interest within the TWD domain as it provided a useful metric for working one-on-one with authors, and to invite them to interpret the results in relation to their work. This allowed the conversation to be more about the guiding of the author and not about a difference in personal tastes between people.

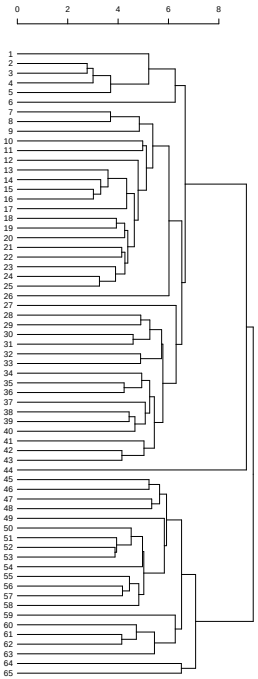

Figure 7: Chapter structure of 'The Shadow Hours', first snapshot from drafts

Feedback from the company was universally positive, particularly in the area of how comfortable they were in interpreting the visualisation for themselves, and in helping with the more commercial aspects of the business.

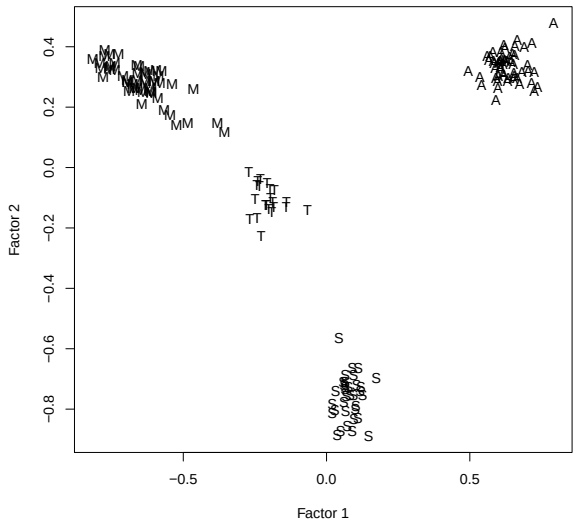

Figure 8: Comparing a novel (T) with its commercial competitors

Ordered

Although the planar presentations are useful, they do not address the fact that the narrative is consumed linearly, and so reflect only those differences that we are referring to as 'style' or 'mood' between any given successive pair of segments. To gain more insight into the actual structure of the narrative, a visualisation is used that respects the sequentiality of the segments. This section evaluates this hierarchical arrangement of the information in the kernel.

The hierarchical clustering algorithm used here is detailed in [Mur85], and was used as a device to deconstruct the film 'Casablanca' in [MGM09]. Briefly, the algorithm repeatedly merges the least dissimilar pair of adjacent scenes to form a tree-like structure that shows how particular segments of a narrative cluster together.

For example, Figure 2 shows the ordered visualisation of 'Harry Potter and the Half-Blood Prince' by JK Rowling [Row05], in which each segment is a chapter in the novel. Viewing the structure, one can see that the cluster comprising only the first chapter is rated as being remarkably dissimilar to the cluster containing all other chapters. The opening chapter of the novel is a conversation between the Prime Minister of the UK, and the Minister for Magic; the chapter is used mainly for setting up the narrative and the mood, and neither character features significantly in the remainder of the text. A subjective reading of the novel may support that the first chapter was separate structurally from the text. Although the comparative deconstructing of such works to a much lower level of detail is a fascinating subject in its own right, it is outside the scope of this work. In particular, our two target domains focus much more heavily on the use of this ordered visualisation for examining novels as works-in-progress. For more information on this clustering see, e.g. [Mur85, Mur05].

Project TooManyCooks

Figure 7 shows a dendrogram using an early draft of 'The Shadow Hours', which was the test novel for the TooManyCooks Project. The major anomalous section in Figure 7 (chosen by eye) is 44, followed by 26, 27, and 6. Section 44 happens to be the smallest section in the narrative in that draft - and the only one that hadn't been expanded from a skeletal outline into a draft section so it

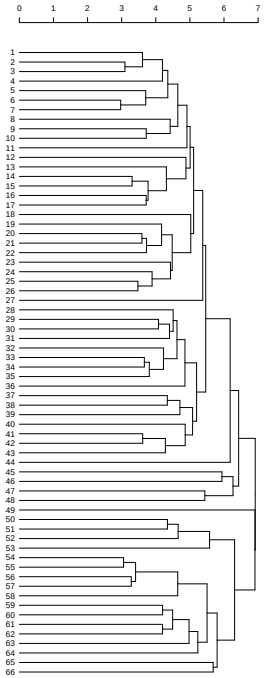

Figure 9: Structure of 'The Shadow Hours', second snapshot from drafts

required attention. Sections 26 and 27 were character development of one of the minor characters; they had been drafted by one team member and had not been reviewed yet by other team members.

Examining Figure 9, which shows a slightly later draft of the same novel, in this draft section 44 is still a clearly anomolous section, but by much less of a degree, and 26, 27, and 6, now merge much more closely with the surrounding chapters. This is compared with contemporaneous notes from the project showing that 44 had now been drafted, and the other scenes were going though second drafts. In this case the dendrogram allowed an 'at a glance' notification of areas that required particular attention and revealed that a section had been missed due to a communication error in the team.

The Writer's Desk (TWD)
Given the much greater amount of time that staff at TWD had to examine a manuscript, the ability to 'immediately evaluate' the structure of a document was less important. Instead the structural diagrams were used to validate, and later guide, the reviewer's own evaluation. During the early stage of the project, staff reviewed documents as normal, and then examined the structural diagrams to see how much their interpretation of the diagram agreed with their interpretation of the text. As trust built, this progressed to reviewing documents before using the diagrams to check that no obviously anomoulous sections were missing, and then to reviewing both the text and the diagram at the same time, allowing the reviewer to re-examine text on the fly and get a much stronger impression of not only where the current section of text is going but how it slots into the overall narrative.

Discussion and Future Work

We have evaluated tools that may be used effectively to augment qualitative analyses of narrative. Our findings are that these techniques can be effective, depending greatly on the situation they are applied in. However, even given the generally positive nature of contributions such as visualisations [Tuf86, SPS11] and the techniques presented here, the publishing community remain generally unwilling to engage - in a set of interviews with 14 members of the industry that were conducted as part of the research, without exception the interviewees reported no use of software for anything other than counting words - moreover only a fraction of the interviewees were interested in seeing demos of any kind of supporting technology. However, some publishing staff have been positive about the idea of at-a-glance market placement and the added-value of being able to check that the section of the book that one has read is typical of the author's voice. Those who have made use of the technology are positive, see, for example, the extract from TWD's testimonial in Figure 1.

This work has given details of our experiences using objectively created visualisations for subjective evaluation in creative fields. Two different visualisations were examined in the context of feedback in the traditional author-publisher/agent model and in a dynamic group writing situation more associated with film, TV, and other new media. We found a generally positive reception to the techniques, although we have also highlighted disadvantages at the level of improvements to be made to the overall workflow, and also at the level of fundamental issues that mean that certain situations are only avoidable by extremely sophisticated users. Areas that were of particular interest to our domains were those that were perhaps situated more at the productivity and economic

The most interesting aspect of this analysis work, has been the way in which it helps to show the flow of the authors writing, helping to show areas that may need attention. This has been especially illustrated in the case of a rewrite we sent for analysis recently, and were able to therefore compare the analysis of the before and after, showing that on correcting editorial issues, the author had made their work a lot more streamlined in line with the rest of their novel. The analysis also allowed us as editors to see how the authors work sat as a whole, by illustrating how the chapters interlinked to each other. On graphs that show clusters of each chapter, it is easy to identify part of the work that stands out for a particular reason, allowing us to then look more closely at that particular part of the document. This in turn helps the author identify problem areas that are usually easily rectified.

Figure 10: Extract from TWD testimonial

ends of the process than the creative; we had particularly positive feedback for those aspects of this work that allowed promotors and agents the chance to see at a glance where a creative work sat in the market space for promotional purposes. Moreover the other uses of the work were in promoting co-operation and a greater degree of collaboration between parties in the production of a creative work.

At a more meta-level of research, it is interesting to consider the level of transparency that is provided to authors using these techniques. For example, some authors may be given the feedback as the agency normally did; some may be told that additional analysis was performed on the text; some may have the analysis worked into the agencie's reports, and in other cases the agency could simply pass on the report verbatim. It would be an interesting area of future research to examine what motivates this choice both at the policy level and at the level of individual authors.

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