

Exploring the content composition of online book reviews

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Abstract: Today, anyone can perform an opinion-expressing form of literary criticism by writing online book reviews. Sellers and publishers recognised the strategic potential of such reviews, for example, to increase sales. However, despite the popularity and recognised importance of book reviews, only little is known about the actual content in detail. Drawing on a category system and manually annotated reviews, this study explores the content composition of book reviews. We disclose frequently used content-related book review components and perform a cluster analysis, exploring which components often occur together. Our results support literary scholars in investigating the digital phenomenon of literary criticism and the study illustrates a sample Computational Humanities project which can be transferred to other research endeavours.

Keywords: Literary Criticism; Culture; Content Analysis; Archetypes

1 Introduction

«*If literary criticism has a future, it is on the web*» (translation of Wolfram Schütte, publicist, 2015). Especially the booming digitalisation has enormous effects on creative industries and offers novel forms of collaboration and participation in cultural practices. As an example, there is a growing interest in online platforms such as LovelyBooks which foster a sociable and collaborative mentality, enabling new formats for anyone to discuss and share opinions on books in a community [KPK19]. Writing an online book review can be described as an opinion-expressing form of literary criticism [LHM13], and is therefore related to the tradition of literary criticism as a professional journalistic form of reviewing and discussing new publications [St97]. In consequence, the formerly clear separation of laypersons and professionals is blurring, and, as suggested by Wolfram Schütte, a user-generated form of literary criticism takes place online [KM17]. Consumers generally trust online reviews as a source of brand information [Ni12] and use reviews for purchase decisions [Dr13]. To gain useful information, the consumers care about the review content characteristics [Wi11]. For example, they are interested in book recommendations or opinions regarding the authors' language style, to consider whether the book might be suitable for themselves. Likewise, sellers and publishers recognized book reviews as strategic instruments to improve book

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visibility, recommendations and sales [Ch08]. To enhance future book production and sales strategies based on the consumer needs, they need to know, for instance, whether their consumers are completely satisfied or whether they express deficiencies like a boring story line, annoying protagonist or cheap thin paper. Although online book reviews are of high importance for various stakeholders, only little is known about the content of such reviews in detail [KM17]. This is problematic as it hinders, for example, literary scholars in redefining the identity and functions of literary criticism in the digital age [KM17], and sellers in understanding the people's opinions on books which might help improve their business [KCR18]. As prior studies focused on general review characteristics like numerical ratings [CM06, Su11] or review sentiments [Sr18], there is a need for understanding the content composition of book reviews. By seeking to answer the following research questions (RQ), we are, to the best of our knowledge, one of the first gaining detailed insights into this:

RQ1: *What kind of content-related components are expressed in online book reviews?*

RQ2: *What archetypes of online book reviews can be identified?*

To answer these questions, based on a large data set of online book reviews, we use a combination of a manual and an automated approach in order to get knowledge from the text [LZH13]: We combine manual text analysis and computer-aided analysis to (1) examine frequently used components of book reviews and to (2) perform a cluster analysis to identify review archetypes. This content-driven analysis supports, for example, literary scholars in investigating the digital phenomenon of literary criticism and in building an enhanced understanding of digital culture and society. For online platform users, our results indicate a variety of common ideas that can be addressed in further book reviews which might contribute to diverse book discussions. Sellers and publishers get deep insights into discussed book components and review archetypes which might help to improve future book productions and sales. From a technical perspective, we provide an alternative to counteract the lack of proper text analysis tools for analysing detailed review content [CM06] by using a combined method approach. Overall, this study illustrates a sample case in which researchers from Computer Science (information systems, computational linguistics) and Humanities (literary studies, cultural politics) are cooperating to investigate a digital cultural phenomenon, which could be transferred to further Computational Humanities projects.

2 Research background

The term *book review* can be defined as an opinion-expressing form of literary criticism [LHM13], and it means asking for terms of arts, their functions and their origin [Ra07]. Characteristic components of reviews include descriptions, explanations, interpretations, recommendation/dissuasion and/or evaluations of cultural artefacts [St97]. Thus, a review is characterised by plenty of different text segments, the so-called *components*. Analysing book reviews, researchers investigated directly observable determinants such as star ratings [CM06, Su11] and review length [CM06, Ku15], and suggested a contribution to review

helpfulness and sales. For instance, the results of analysing Amazon book reviews indicated that the average rating tends to be positive [CM06, HPZ09]. To extract whether book review texts are positive or negative, sentiment analysis [Sr18] has been studied, again, suggesting a predominance of positive sentiments. Referring to literary criticism, through manually analysing book reviews, [KM17] examined categories of everyday communication and professional literary criticism, [Ba15] analysed informative and evaluative statements in laypersons book reviews, and [St15] explicated typical review characteristics. Nonetheless, previous studies are restricted as they focus on limited review characteristics (e.g., star rating, sentiment, evaluative statements) and as they select either a computer-aided or manual text analysis approach. However, to derive meaningful knowledge from text data, the combination of both approaches is suggested [LZH13]. We contribute to this research by investigating a multitude of book review characteristics (i.e., components) and by combining manual text and computer-aided analysis as it seems worthwhile for gaining detailed insights into content-related features of book reviews, based on a large data set.

3 Research design

We conducted a three-staged research design (Fig. 1). To obtain frequently used review components, we iteratively developed a category system (Stage 1) and applied it for annotating book reviews (Stage 2). Based on this, we performed a cluster analysis to explore which of these components often occur together (i.e., archetypes) (Stage 3).

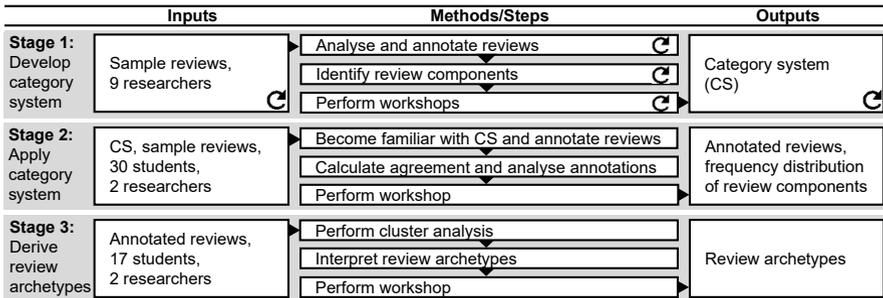


Fig. 1: Research design

Stage 1. First, we selected ten reviews from different platform types (e.g., social media, other rating and exchange platforms), addressing artistic artefacts and books (as our overriding goal is to analyse reviews of cultural artefacts in general across platforms). Nine researchers from Computer Science and Humanities independently analysed the reviews, named text segments with short labels that characterise the review components, and consolidated their components in a workshop. Second, the researchers independently structured and reassembled the identified components, and built a category system by consolidating their results in a workshop. Third, we selected further reviews and the researchers independently applied the system, annotating review text segments with the components. They compared

their experiences while annotating reviews and modified the system. These steps were repeated several times until the saturation of the system was perceived by the researchers [for more details see Ku18].

Stage 2. After becoming familiar with the system, 30 German students annotated review text segments with the help of our system. The completion of the task was rewarded with bonus points in a course. We randomly selected 430 German Amazon book reviews (e.g., novel, textbook) [HM16, Mc15]. Due to availability for scientific research, the large database, and the variety of products (different books, authors) and reviews, we decided to use Amazon reviews. To measure the nominal scale agreement (Fleiss kappa) among different annotators [Fl71], each review has been assigned to three students. However, not all reviews have been annotated threefold because only 24 of 30 expected students completed the task. Besides, sometimes, not all text segments have been fully annotated with components. Therefore, we got rather low kappa values. To ensure the inter-annotator agreement, we passed back the annotated reviews to small student groups who discussed and, if deemed necessary by the majority, adapted their annotations. To support focused discussions, we provided a subset of reviews and suggested, if not present, additional annotations. Finally, we got 282 agreed and annotated reviews.

Stage 3. To derive archetypes, we performed a cluster analysis which is an established analytical tool for investigating correlations in datasets [BMI11]. We utilised 282 reviews as objects and the annotated components of the category system as clustering variables, and we applied a two-step approach [PS83, Re16], using the python module *scikit-learn* [Pe11]. (1) To identify the number of clusters, we performed the *ward's method* which forms hierarchical clusters of subsets on the foundation of their similarity. Initially, the method combines two closest subsets into one cluster. This step is repeated until all subsets are in one cluster [Wa63]. The number of identical components of the category system determined the similarity between the two subsets. To follow the sequence in which the subsets have been united in relation to the distances, we plotted a *dendrogram*. Regarding the significant jumps in the distance of the joint clusters, we identified four or eight clusters as useful. (2) We applied the *K-means algorithm*, one of the most common clustering methods [El03], for the four and the eight cluster solution. The method divides data into clusters, minimising the within-cluster sum of squares [HW79]. We used *k-means++* to select initial cluster centres, the algorithm iterated 300 times, and within each iteration it ran with ten different centroid seeds to get the best results. Thereafter, we manually evaluated the resulting clusters for their explanatory power and chose eight clusters, to get deep insights into the nature of the review archetypes. Next, five groups of students and two researchers independently interpreted the clusters. They analysed the most common components of each cluster and compared the clusters to find characteristic differences and similarities. Besides, they randomly traced back assigned reviews of each cluster, to check and, if necessary, adapt their interpretations. Finally, the results were consolidated in a workshop, resulting in eight interpreted archetypes of book reviews.

4 Content of online book reviews

Annotation example. 24 students annotated review text segments (text segments can be multiple sentences, a sequence of terms or a single term) with the components of the category system. Text segments can be assigned to more than one component. To illustrate how components are attached to review text segments, we present an annotation example (Fig. 2). Reading the sample review “I can’t wait for the last book to come. The book is highly recommended.”, we can identify and annotate components of our category system. First, the reviewer shows his/her feelings (relation to own emotions) and addresses another book of the same author (addressing other artefacts of the same author), writing that he/she can’t wait for the last book to come. At the same time, the reviewer positively assesses the artefact. Second, the reviewer recommends the book in general (view of the artefact as a whole), without detailed explanations.

Annotated review text	
I can't wait for the last book to come.	The book is highly recommended.
relation to own emotions	view of the artefact as a whole
addressing other artefacts of the same author	recommendation
positive assessment/agreement	

Fig. 2: Annotation example of a book review (translated from German)

Frequency analysis. The students analysed the reviews, using 65 components of the category system. In sum, in 282 reviews 5381 text segments have been manually identified and annotated with components. Some of them have been more frequently used than others. For reasons of space limitations, we present the ten most common and the ten least recognised components (Fig. 3).

Review components			Review components		
	abs. freq.	rel. freq.		abs. freq.	rel. freq.
1	905	16,82%	56	6	0,11%
2	519	9,65%	57	5	0,09%
3	296	5,50%	58	5	0,09%
4	293	5,45%	59	4	0,07%
5	290	5,39%	60	2	0,04%
6	221	4,11%	61	2	0,04%
7	193	3,59%	62	1	0,02%
8	187	3,48%	63	1	0,02%
9	174	3,23%	64	0	0,00%
10	158	2,94%	65	0	0,00%
...%		Σ 5381	100%

Fig. 3: Distribution of components of the category system for book reviews

Regarding the frequency distribution, *very often*, reviewers express their positive assessment/agreement, discuss the artefact (i.e., the book) as a whole without quoting detailed information (the second sentence of the annotation example illustrates such an observation, Fig. 2) and also address individual content-related aspects of the artefact (i.e., addressing the characters or story line of the book). Besides, reviewers summarise contents, express their own emotions, assess negatively and discuss the language style of the book. Moreover, interpretations and mention of the content without assessment are recognised. *Very rarely*, reviewers relate to other reviews (e.g., responding to other reviews) or address the history

of the artefact (i.e., the context of book emergence or publication). In addition, books are rarely discussed on a detailed level in terms of other artefacts (i.e., discussion with a concrete reference to certain book contents). Besides, the publisher or its backgrounds and literary-historical epochs are seldom quoted in reviews. Moreover, reviewers rarely address the general goal or task of writing a review (i.e., reflections on the review text itself) and the review structure (e.g., use of headlines or paragraph). Very rarely, reviewers introduce themselves, address ISBN information or leave technical comments related to the platform (e.g., ease of use, format requirements).

Archetypes. We identified eight clusters of online book reviews, each comprises between 17 and 73 reviews and has a different focal point along the components of the category system. As the components of each cluster are collectively exhaustive, the results can be read as percentages, for example: 18,39% of the reviews of Cluster 1 contain positive assessments and 5,84% address the character of the artefact (Fig. 4). The darker the colour of a cell, and the percentage of a component, the more it is shaping a cluster. For reasons of presentation, we illustrate the topmost shaping components of the clusters. Thus, we consolidate 46 components that are not characteristic for one of the clusters and therefore have low percentages (“other 46 (of 65) components”).

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8	
Number of reviews per cluster	73	17	56	29	33	31	24	19	
Components of the category system	positive assessment/agreement	18,39%	18,12%	19,62%	12,71%	17,70%	16,06%	14,77%	13,28%
	view of the artefact as a whole	10,95%	8,09%	7,53%	11,30%	14,40%	8,72%	8,44%	6,94%
	content - fictional character	5,84%	2,59%	3,63%	5,78%	1,65%	3,07%	7,17%	9,02%
	content - story line	4,00%	1,29%	4,57%	5,78%	2,06%	3,77%	7,17%	9,91%
	summary	4,24%	2,59%	3,76%	3,59%	3,70%	5,75%	6,75%	8,92%
	relation to own emotions	3,60%	4,53%	5,11%	3,08%	2,47%	5,15%	2,53%	3,57%
	negative assessment/disagreement	3,20%	2,59%	4,17%	3,47%	4,94%	1,78%	4,22%	4,66%
	language style	3,76%	2,91%	3,76%	2,95%	1,65%	3,07%	1,69%	4,06%
	classification/interpretation	3,28%	5,83%	3,76%	3,72%	3,29%	2,68%	3,38%	1,49%
	mention without assessment	1,44%	3,56%	1,61%	3,72%	2,06%	4,86%	1,69%	2,97%
	content in general	1,68%	3,24%	2,82%	2,05%	2,88%	4,76%	1,27%	3,07%
	physical properties of the artefact	1,44%	2,27%	1,48%	0,77%	6,17%	4,56%	3,38%	1,09%
	author	2,88%	0,97%	2,82%	2,44%	0,00%	1,49%	2,11%	1,88%
	recommendation in general	2,08%	0,97%	1,08%	3,59%	2,06%	1,78%	2,53%	0,59%
	outer appearance	1,28%	4,21%	1,61%	0,77%	2,47%	1,98%	5,49%	0,89%
	representation of your own conviction	1,60%	1,62%	0,94%	1,80%	1,23%	2,08%	1,27%	1,49%
	history of provision	1,52%	2,27%	2,28%	0,51%	4,94%	0,79%	5,06%	0,30%
	recommendation for certain target group	0,80%	0,97%	1,08%	1,80%	4,12%	2,38%	2,11%	0,59%
	citation	0,72%	4,21%	1,75%	0,64%	0,00%	1,09%	0,00%	0,69%
	other 46 (of 65) components	27,34%	27,18%	26,61%	29,53%	22,22%	24,18%	18,99%	24,58%
Σ	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	

Caption: the darker the colour of a cell, the higher the percentage within a cluster

Fig. 4: Results of the cluster analysis

In the following, we present the interpreted clusters, utilising illustrative review cut-outs (translated from German to English) and highlighting the most typical components of each cluster: **Cluster 1**—*content summary and positive assessment of the artefact*. “I haven’t read such a well thought-out, perfidious book for a long time [...] Awesome! [...] But first, let’s talk about the writing style of Gillian Flynn. She changes between the perspective of Nick and Amy. Nick is exposed with all feelings, sensations and actions. Amy, on the

other hand, can only be seen from a diary perspective [. . .].” This review snippet illustrates that the reviewers of Cluster 1 positively assess the artefact as a whole, summarize detailed content information (i.e., characters and story line), address the language style of the book, and offer insights into their own emotions. **Cluster 2—emotional, positive interpretation of the artefact.** “The combination of human everyday life and fairy tales makes this series so fascinating. Where would Snow White work if she lived in our world? [. . .] This first volume mainly deals with the clarification of the murder of Rose Red [. . .].” Reviews of this cluster are characterised by emotional narrations and positive assessments, interpreting and scrutinising general content-related aspects of the artefact. Sometimes, reviewers not only refer to the content in general, but also to certain text passages or quotations. Besides, outer appearances of the artefact are discussed. **Cluster 3—emotional, critical interpretation of the artefact.** “Partly, the story line had some hanging parts, however, I still devoured the book within a few days. The author manages the development of the main character [. . .] well. This fascinated me.” As Cluster 2, the reviews of Cluster 3 are characterized by emotional narrations related to the artefact as a whole. Interpreting detailed content-related aspects (story line), the reviewers express themselves more critically, indicating both positive and negative assessments. Moreover, reviews of this cluster contain a content summary and address language style. **Cluster 4—recommendation of the artefact.** “[. . .] Hanna, the main protagonist, can sometimes be a little annoying [. . .]. But she balances it out with her refreshing personality. She just doesn’t leave everything behind as soon as she meets a man (even a man like Drew who is already a real treat). A great book, I can only recommend it [. . .].” Positively assessing the artefact as a whole, reviewers of this cluster recommend the artefact in general, without addressing a certain target group. Doing so, they summarise detailed content-related aspects (character, story line) as well as interpret and/or only mention them. **Cluster 5—critical assessment of physical properties and history of provision.** “I was one of the first pre-orders and I was really happy when the book arrived. After opening the package, I was really disappointed: slanting printing, broken binding, cheap thin paper. Of course, I immediately complained about it and five weeks later, I got a new book. Thank God, the binding and printing were ok.” This review is exemplary for Cluster 5, addressing physical properties of the artefact (e.g., quality of printing or paper) and explaining the history of provision of the artefact (e.g., delivery by mail). In general, the reviewers assess these aspects both positively and negatively. Moreover, reviews frequently contain recommendations for a certain target group. **Cluster 6—superficial summary and positive assessment.** “I love this book as much as I love the movie. The book gives nice insights into the work of an animation studio.” In contrast to Cluster 1, where reviews are characterised by detailed content summaries, reviews of Cluster 6 contain more superficial summaries or mentions of the artefact. As the sample review illustrates, the artefact as a whole is positively assessed, addressing the content in general. Furthermore, reviewers show their own emotions and sometimes address the physical properties of the artefact. **Cluster 7—critical assessment of outer and inner appearances.** “I ordered this book in order to improve my drawing skills after it had been recommended from various sources. First, I can say that I would recommend this book to anyone interested in drawing. In multiple chapters, Andrew Loomis gives hints for more credible characters. [. . .] The only criticism

is minor printing errors that sometimes leave black spots on the pages [. . .].” Regarding the characteristic components of Cluster 7, there are overlapping characteristics to Cluster 1 and 5. Reviews of Cluster 7 address both detailed content-related aspects and the history of the provision. Besides, they are characterised by addressing the artefact as a whole and its outer appearance. In general, these aspects are both positively and negatively assessed. **Cluster 8—*content summary and criticism***. “I have to say that I really like the protagonist Quentin and I liked the first third of the book very much. Margo and Quentin drive around the city at night and Quentin helps Margo playing jokes. [. . .] After that, unfortunately, the story was dragged into the long run. Not much really happened [. . .].” Like Cluster 1, the reviews of Cluster 8 are also characterised by a detailed content summary. However, in contrast to Cluster 1, the reviewers are more critical of content-related aspects by assessing it both positively and negatively.

5 Discussion, implications and conclusion

We believe this study to be an important step in investigating online book reviews as a user-generated form of literary criticism. Applying the category system for Amazon book reviews, we identified that the ten most commonly annotated components represent about 60% of all 65 considered components. Consequently, only a small subset of components is usually addressed in our sample, which might indicate a strong focus on certain aspects in a review. Exploring review archetypes, we found that despite some kind of closeness between some clusters (e.g., positive assessment/agreement and view of the artefact as a whole are present in all clusters) there can be identified nuanced and distinct differences which provide deep insights into the nature of review archetypes.

Based on these archetypes, literary scholars are supported in investigating the digital, user-generated form of literary criticism. Hence, they can compare literary criticism of users (i.e., laypersons) and professionals, to identify the differences and commonalities of criticism in consequence of digitization. In addition, knowing which book characteristics are discussed by reviewers, platform providers can develop strategies enhancing customers’ review participation behaviour. The formulation of templates for writing reviews, for instance, by requesting the reviewers to express their opinions on the language style of the book, might support platform providers in managing the review content to improve the desired review quality.

To conclude, this study determines frequently used content-related review components and derives eight archetypes of online book reviews. Overall, we hope that this work provides interesting insights into a Computational Humanities project and that it raises new discussions on the literary criticism field in a progressively digitalised world.

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