The Impact of Question Type and Topic on Misinformation and Trolling on Yahoo! Answers

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Abstract. Trolling and misinformation are ubiquitous on social media platforms, such as Yahoo! Answers. Yet, little is known about the impact of question type and topic on the extent of trolling and misinformation in answers on these platforms. We address this gap by analyzing 120 transactions with 2000 answers from two Yahoo! Answers categories: Politics & Government and Society & Culture. We found that trolling and misinformation are widespread on Yahoo! Answers. In most cases, trolling in questions was echoed by more trolling in answers, and misinformation in questions with more misinformation in answers. We also found that 1) more misinformation and more trolling were found in answers to conversational questions than to informational questions; 2) more misinformation occurred in answers to questions in politics than answers to questions in culture; and 3) trolling significantly differed between politics and culture.

Keywords: Trolling · Misinformation · Question answering sites

1 Introduction

Question answering sites are online communities in which users interact with one another to ask and answer questions. On Yahoo! Answers, for example, users can ask questions on a variety of topics and provide answers to other users' questions. Question answering sites allow anyone to contribute, and thus they can abound in misinformation (inaccurate information) and disinformation (*intentionally* inaccurate information); answer accuracy is an important aspect of the site and misinformation impedes accuracy. While trolling is often found on these sites, little research on question answering sites has aimed to examine the impact of trolling on the quality of information shared on these sites and the well-being of the users and administrators of these communities [11, 13]. This lacuna might be due to the fact that trolling is perceived to have little impact on answer quality [19], or because it is not as evident on question answering sites as other concerning behaviors [11]. It is also possible that it is because trolling is notoriously difficult to define, but typically a troll is "a person who intentionally antagonizes others online by posting inflammatory, irrelevant, or offensive comments or other disruptive content" (Merriam-Webster, n.d.). Trolling can range from light-hearted and humorous to offensive and threatening, and can take different forms on different Internet platforms

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[e.g. 15, 26]. Trolls often aim at eliciting an emotional reaction from other Internet users; the troll may do this purely for their own enjoyment, or to spread political or ideological beliefs. Trolling involves deception, misinformation and disinformation [14]. There is much confusion over the meaning and use of the concepts of misinformation and disinformation; at times, these are used interchangeably. In general, misinformation seems to refer more generally to incorrect information, whether it is malicious in nature or simply a mistake of some sort, whereas disinformation carries with it an implication of intent and malice; in other words, misinformation is created on accident, while disinformation is created with the intention to harm people [18]. However, because it can often be difficult to discern intent, especially online, misinformation and disinformation are commonly confused and often used as synonyms, and labeling a piece of information as misinformation or disinformation can depend on the actor's intentions as much as on the standards of the one evaluating it. Intentionally false or misrepresentative information that succeeds in misleading the recipient involves deception. As Søe [33] explains, deception is a "success term," while the term disinformation does not imply success. Caddell [4] says that there are two forms of deception, fabrication and manipulation. He describes fabrication as "false information [created] and presented as true … for the purpose of disinformation," and manipulation as "the use of information which is technically true, but is being presented out of context in order to create a false implication" (p. 1); thus, deception does not always imply the presence of disinformation. Trolls often act under hidden identity in deceiving others [31].

Scholars that focused attention on trolling on question answering sites report that trolling was one of seven content-bearing terms in user-reported behavior on the site Answerbag, but other issues, such as users creating multiple profiles to manipulate voting, were of equal or more concern [11]. Others found that trolling was mentioned only once in a study on how users judge answer quality on Yahoo! Answers, when a participant in the study did not think trolling occurred on the site [19]. Nonetheless, Guy and Shapira [13] conducted a large survey of troll questions on Yahoo! Answers and proposed a seven-point classification system to separate "troll questions" from "clean questions." They identified characteristics that distinguish troll questions from legitimate questions and found that 1) questions categories most prone to trolling are conversational rather than informational in nature and include: society & culture, sports, social science, food & drink, and politics & government; 2) the average length of trolling questions is longer and the average answer to these questions is shorter; and that 3) trolling questions attract more user activity, provoke similar answers, and elicit more negative feedback. Trolls often aim at eliciting an emotional reaction from other Internet users; the troll may do this purely for their own enjoyment, or to spread political or ideological beliefs; trolling can range from light-hearted and humorous to offensive and threatening, and can take different forms on different Internet platforms [e.g., 15, 26]. Attention to trolling from both scholars and the media is quickly growing, perhaps because it has become a ubiquitous part of our daily life online. With these few studies and their mixed findings, there is clearly a need to examine if and to what extent trolling impacts questions and answers on question answering sites; it is also critical to gain a better understanding of the relationships between trolling and misinformation.

Furthermore, of specific interest is the possible impact of question topic and question type on the extent of trolling and misinformation; questions about certain topics may lead to more trolling and misinformation, and Yahoo! Answers categories might predict levels of trolling and misinformation in answers [13]. Then, certain trolling behaviors may differ across categories because each category attracts its own community of users forming different norms of behaviors [29]. For example, questions with overly polite tones on Yahoo! Answers or Stack Overflow communities were less likely to be answered [5]. Conversely, others argue that linguistic indications of gratitude can increase the likelihood of success [2], and that politeness is a key factor in assessing the quality of answers on social Q&A sites [37]. Clearly, question answering differs on various platforms and on various categories, and these differences may impact the extent of trolling and misinformation. We thus propose that:

H1: Question category will impact the extent of trolling and misinformation.

Question type may also impact the extent of trolling and misinformation. Troll questions [13] may have unique characteristics that may lead to more misinformation or disinformation, and more trolling in their answers. Some questions never even receive an answer, partially depending on the level of details, specificity, clarity, accuracy, and socio-emotional value of the questions [6]. Because not all questions are alike, it is possible that conversational questions, which "are asked with the intent of stimulating discussion… [and are aimed] at getting opinions" [17] may lead to more trolling than other questions. At the same time it is possible that informational questions, which "are asked with the intent of getting information that the asker hopes to learn or use via factor advice-oriented answers" [17], may lead to more misinformation than trolling. Thus we propose that:

H2: Question type will impact the extent of trolling and misinformation.

We designed a study with 120 transactions (and 2000 answers) from two categories on Yahoo! Answers to address test the two hypotheses and answer the following research questions: 1) What is the extent of trolling and misinformation on Yahoo! Answers?; and 2) Does trolling and misinformation vary based on question topic (politics vs culture) and type (conversational vs informational)?

2 Background

Scholars have focused attention on SQA communities [28], trying to understand the motivation to answer questions, for example [e.g., 3, 7, 22]. They found that users are motivated by their identification with and joy of helping the community [3, 7], and they continue to contribute when they feel that the other members of the community treat them fairly, appreciate their contributions, and in general meet their expectations [22].

Others focused on the quality of answers on various SQAs, mainly in an effort to re-use high quality answers, showing that answer quality varies between questions, topics, and sites [e.g., 5, 8, 27, 34]. Site popularity does not always correspond to answer quality [30]. Answer quality varies widely on different platforms, with Wikipedia Reference Desk having the highest quality answers [30], and Yahoo! Answers, which is a community based SQA, having the lowest [8]. The quality of answers on Yahoo! Answers was commonly assessed through the platform's best answer (the answer selected by the

question-asker as being the most helpful; this feature exists on Yahoo! Answers), and occasionally other answer quality dimensions have been used [e.g., 1]. John, Goh and Chau [21] posit that the quality of answers as ranked by users on Yahoo! Answers does not correlate with answer quality ranked by experts, and Fichman [8] suggests that user rankings are subjective and therefore problematic. In line with this approach Kim and Oh [23] found that in 29.8% of cases where users chose "best answers" in Yahoo! Answers, their selections were based on socio-emotional criteria rather than on the content or utility of the answer. Studies found that better answers are longer [1, 16, 20], and include references to external sources [12]. John, Goh, and Chua [21] further proposed that quality of answers should be measured by social (user interaction and feedback) and content features (intrinsic and extrinsic content quality); other scholars agree that content features are critical in assessing answer quality [8, 16, 20, 30]. Fichman [8] used three content measures: accuracy (whether the answer to the question is correct), completeness (whether the answer thoroughly responds to all parts of the question), and verifiability (whether the answer provides sources). Ong, Day, and Hsu [25] also consider format (whether the answer is presented well) and currency (whether the answer is up to date) in measuring quality as determined based on the user's perception. Fichman [8] also examined if the "whole" answer, which is the composite of all the answers provided by users to the question, forms a higher quality answer than the first answer or the "best" answer, and found that the whole answer is more complete and more verifiable but not more accurate than the first or best answer. Best answers generally are of the same quality as whole answers; both are of higher quality than first answers [30]. High-quality answers include, besides positive votes, completeness, clear presentation, and reliability and accuracy of information; answer length is a feature weakly associated with high-quality answers [20]. On average, seven answers to a question provides the highest quality whole answer on the collaborative question answer site Yahoo! Answers [30].

Harper et al. [16] propose that there are two types of questions on social question answer sites: informational, which are asked with the intent of getting information to learn or use via fact- or advice-oriented answers; and conversational, which are asked with the intent of stimulating discussion, aiming at getting opinions. Some questions are not answered, especially if they are very short [1, 16], or when they are unclear or overly polite [6, 36]. Clearly, question types and attributes impact the extent and quality of answers [e.g. 6]. It is likewise possible that they impact the extent of trolling and misinformation.

3 Method

Using data from Yahoo! Answers we designed a study to address the research questions: 1) What is the extent of trolling and misinformation on Yahoo! Answers?; and 2) Does trolling and misinformation vary based on question topic (politics vs culture) and type (conversational vs informational)?

3.1 Data Collection

We collected data at midnight (EST) on November 9, 2016 from two Yahoo! Answers categories: "Politics & Government" (=politics) and "Society & Culture" (=culture), scrapping all the data from the previous day, which included all the questions belonging to each category and their corresponding answers. This resulted in 163 transactions[1], with 4,668 total answers, out of which we chose to analyze a sample of 2,000 answers (1,000 answers from each category), along with the 120 questions associated with these answers (65 questions from culture and 55 questions from politics). We uploaded the sampled data into Nvivo 12. While the number of questions varied between the two categories (55 in politics and 65 in culture), the number of answers did not (1,000 answers per category). These data, taken from two categories on one question-answering site on one day, the day of the 2016 American presidential election, are necessarily limited.

3.2 Data Analysis

We developed a coding scheme based on prior research on trolling [29, 32], and social question answering [8, 17] and modified it in an iterative process of coding, discussion among the two authors, and revisions; the final coding scheme included 16 codes (Appendix I). We coded the data at the individual post. To assure coding reliability, one coder coded the entire data set and a second coder coded a sample of the data; intercoder reliability was 89% simple agreement.

Using Nvivo matrix queries we were able to generate frequency tables, and using SPSS 21 we tested for statistical significance. Pattern coding and code-co-occurrence [24], using Nvivo matrix query, helped us identify the topic and type of questions that are associated frequently with misinformation and trolling. We then created a subset of all the transitions with questions that included misinformation, disinformation, or deception in at least one of the corresponding answers for further analysis; we compared code-co-occurrences in that subset of questions with the total set of questions.

4 Findings

We report our findings in two sections, each addressing one of the two research questions.

4.1 Trolling, Answer Quality, and Misinformation on Yahoo! Answers

Answer Quality and Misinformation on Yahoo! Answers. We found inaccurate information frequently, with disinformation in 6% of the posts (132), misinformation in 8% of the posts (171), and deception in 4 posts (Table 1). Most of the inaccurate information appeared in answers, while in questions it appeared infrequently.

Answer quality in our data is low - accuracy (24) and completeness (19) levels around 1%, verifiability (93) at 5%, and relevance (393) at 20% (Table 1). The low levels of answer accuracy and completeness are in sharp contrast to some prior research that reports much higher levels of answers quality. There are several factors that may

[1] A transaction includes a question and all of its corresponding answers.

contribute to these low levels. First, while these other studies examined the quality of informational questions only [8, 30], we included conversational questions, and informational questions account only for about 25% of the questions; since opinionated answers to conversational questions cannot be defined as accurate or inaccurate, this results in a lower overall accuracy level. Second, while other studies have looked at the transaction level or at the best answer post [8, 30] we have analyzed quality at the individual post level.

Table 1. Code frequencies by category in questions and answers

Code Category	Code	Culture				Politics				Total	
		Qs		As		Qs		As			
		#	%	#	%	#	%	#	%	#	%
Answer Quality	Accuracy	0	0	17	1.7	0	0	7	.7	24	1
	Completeness	0	0	12	1	0	0	7	.7	19	1
	Relevance	0	0	299	30	0	0	94	9	393	20.
	Verifiability	0	0	77	8	0	0	15	1.5	92	5
Question Type	Conversational	49	75	0	0	42	76	0	0	91	76
	Informational	16	25	0	0	13	24	0	0	29	24
Inaccurate Information	Misinformation	2	.3	51	5	7	13	111	11	171	8
	Deception	0	0	1	.1	0	0	3	.3	4	.2
	Disinformation	2	.3	31	3	0	0	99	10	132	6
Trolling	Derailment	0	0	118	12	0	0	289	29	407	19
	Emotional Display	2	6	60	6	10	18	85	8.5	157	7
	Insulting	7	11	184	18	10	18	316	32	517	24
	Personal Attacks	0	0	83	8	0	0	139	14	222	10
	Provocation	28	43	514	51	36	65	459	46	1,037	49
	Sarcasm	6	9	408	41	10	18	276	28	700	33
	Swearing	1	3	35	3.5	2	4	68	7	106	5
Total		113		1890		130		1968		4101	

Trolling on Yahoo! Answers. We found trolling behaviors frequently, with more trolling behaviors in answers, compared with questions, regardless of category. As can be seen in Table 1, the most frequent trolling behaviors involve provocation, sarcasm, insulting, and derailment. We also found that the tone set up by the questions is most of the time echoed in answers; when certain trolling behaviors appeared frequently in questions, they appeared more frequently in answers. For example, insulting appears in 18% of the questions on politics and then even more frequently in 32% of the answers

on that category. A similar increase is evident in culture when 11% of the questions included insulting language, and then 18% of the answers did. It is possible that each of these trolling behaviors serve as effective trolling bait that triggers others to react.

4.2 Differences in Trolling and Misinformation Based on Question Topic and Type

The average number of answers per question was higher in the political category (18.1) than in culture (15.38), but the proportions between informational and conversational questions did not significantly differ between the categories (conversational questions in politics 75.4% and in culture 76.4%).

Differences Between Politics and Culture in Answer Quality, Trolling and Misinformation. We found that more answers on culture, compared with politics, were relevant, accurate, and verifiable (Table 1). We found that question topic impacts the extent of misinformation; there were more instances of misinformation and disinformation in politics compared with culture (111 vs. 51 and 99 vs. 31 respectively) (Table 1). These differences were statistically significant and hypothesis H1 was partially supported.

Table 2. Differences between politics and culture in answer quality, trolling and misinformation

Category	Code	χ^2
Answer quality	Accuracy	4.217**
	Completeness	1.32
	Verifiability	43.797***
	Relevance	133.085***
Trolling	Derailment	92.201***
	Emotional display	4.647**
	Insulting	46.464***
	Personal attacks	15.89***
	Provocation	6.389*
	Sarcasm	38.714***
	Swearing	11.147***
Misinformation	Deception - N/A	
	Disinformation	35.332***
	Misinformation	24.181***

*p < .01, **p < .05, ***p < .001

Differences in Trolling and Misinformation Based on Question Type. As can be seen in Table 3, misinformation appeared in 63.3% of the answers regardless of the type of questions; yet, misinformation was found slightly more frequently in answers in conversational questions (63.7%) than in informational questions (62.1%). The differences in level of misinformation between the two types of questions was not significant ($\chi^2(1, N = 200) = 1.49, P = .699$), and hypothesis H2 was partially not supported. future research may try to use other question typologies to identify a more nuanced understanding of the impact of question type on misinformation.

Table 3. Question type, misinformation and trolling

Category	Code	Conversational		Informational		All questions	
		#	%	#	%	#	%
Question type	Conversational	91	100.0	0	0.0	91	75.8
	Informational	0	0.0	29	100.0	29	24.2
Trolling	Emotional display	9	9.9	2	6.9	11	9.17
	Insulting	13	14.3	2	6.9	15	12.5
	Provocation	51	56.0	11	37.9	62	51.7
	Sarcasm	10	11.0	4	13.8	14	11.7
	Swearing	2	2.2	0	0.0	2	1.7
Misinformation		6	6.6	3	10.3	9	7.5
Questions that led to misinformation		58	63.7	18	62.1	76	63.3

We found that the differences in the extent of trolling based on question type were statistically significant ($\chi^2(1, n = 200) = 6.503, p = .011$); for example, we found significantly more provocation in conversational questions (56%) than informational questions (37.9%) (Table 3), and Hypothesis H2 was partially supported.

It is perhaps not surprising that we found more provocation in conversational questions, because using provocation is one way to assure responses from other users. Provocation on its own cannot be a proxy for trolling, because only when it appears along with other trolling behaviors does it count as trolling [29]. In fact, in our study, provocation co-occurred frequently with each of the other trolling behaviors (Table 4), and mainly with insulting, derailment and sarcasm.

Table 4. Trolling behaviors code co-occurrence

	Derailment	Emotional display	Insulting	Personal attacks	Provocation	Sarcasm	Swearing
Derailment	407	36	151	64	280	168	29
Emotional display	36	157	45	19	86	37	15
Insulting	151	45	517	94	401	223	65
Personal attacks	64	19	94	222	147	101	34
Provocation	280	86	401	147	1037	474	79
Sarcasm	168	37	223	101	474	700	38

5 Discussion and Conclusion

Our findings demonstrate variation in information quality across subject domains, similar to findings on other platforms, such as Wikipedia [33], or across subject categories on Yahoo! Answers [1]. Wilkinson and Huberman [32] note that Wikipedia articles in more "popular" subject domains will have more edits, and that in general, a greater number of edits is correlated with higher quality. Others argued that seven answers provide the optimal answer quality on Yahoo! Answers [9]. However, we found that more answers per question (in politics) actually increased the level of misinformation and disinformation and reduced the quality of answers in terms of accuracy and completeness; still more answers per questions increased answer quality in terms of relevance and verifiability in politics, compared to culture. Regardless of the direction of the change, question category impacted all quality measures and misinformation. Thus the relationships between number of answers, quality measures, and misinformation is complex and multidimensional, and future research may focus on the relationships between the various measures of quality with misinformation.

We also found that there are significant differences in trolling between the two categories, supporting hypothesis H1 (Table 2). However, while we found in the politics category significantly more derailment, emotional display, insulting, and swearing than in the culture category, we found significantly more sarcasm and provocation in culture than in politics (Table 1). As such, we conclude that question category significantly impacts the level of trolling, but specific trolling behaviors are more common in the culture category while others are more common in the politics category. Others found more trolling in politics compared to health, entertainment, and religion, in a study that compared trolling on subreddits [10]. Future research should further examine and explain the more nuanced differences across topics.

Our findings are in line with prior research that suggests that trolling is context-dependent and varies by context [29]; however, we provide a more nuanced understanding of these variations, by using the same socio-technical platform, Yahoo! Answers, in comparing the two categories. Interestingly, in the politics we found more trolling tactics that are associated with malevolent anti-social trolling, such as insulting and swearing,

but in the culture, we identified more tactics that are often associated with humorous and light-hearted trolling, such as provocation and sarcasm. Expanding on Sanfilippo, Fichman and Yang's [29] work that linked seven behavioral dimensions with four types of trolling, we found that the topic impacts the extent of some trolling behaviors and tactics, within one sociotechnical environment.

In this study we demonstrate that trolling is an integral part of social question answering sites. More than half of the posts involved provocation and about one-third involved sarcasm. We also provide evidence to show that the extent of trolling and misinformation significantly vary based on question topic and question type. Misinformation appeared in questions regardless of the nature of the question or the topic, but more misinformation appeared in politics than culture and more trolling appeared in conversational questions than informational questions. We found no significant differences in levels of misinformation based on question type, and while we found that question topic impacts the extent of trolling, we report mixed findings in terms of the specific trolling behaviors. In the politics category, more posts contained malevolent trolling (swearing, insulting, and personal attacks), while in the culture category, more posts contained sarcasm. We also provide evidence that trolling, as a socio-technical concept, varies not only across socio-technical platforms, but also between categories within the same platform.

Appendix - Coding Scheme

Code	Description	Example
Trolling/Swearing	Using vulgar language, usually to elicit a reaction	This is because CATHOLICS ARE PEDOPHILLIE CULT that rapes innocent children. F*uck catholicism!!!
Trolling/Insulting	Making intentional statement to insult an individual or group of people	Because atheists have integrity and self respect. Christians are sinners anyway, so raping and killing are OK so long as they ask for forgiveness
Trolling/Sarcasm	Using humor, hyperbole, and other rhetorical devices to convey a nuanced public opinion	Sure, she will put that at the top of her list. Forget trade agreements, national debt, war in middle east, and national health insurance. Lets get right to the important issues: hamburgers
Trolling/Provocation	Making intentional claims to elicit a specific reaction	Gods are imaginary creatures, and they don't exist. But if one did exist, and it chose a piece of siht like Trump, then everything I've ever thought about the BuyBull god is accurate…

(*continued*)

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Code	Description	Example
Trolling/Derailment	Purposely leading a conversation off course	Never mind triune, first you have to prove that gods exist…but you can't so why be concerned with interpretation of mythical stories?
Trolling/Emotional display	Emotional displays in reference to a subject/their behaviors (e.g., all caps writing, multiple exclamation points). This deals with the message's form	BYE BYE LIBTARDS! GET OUT!
Inaccurate information/Deception	Intentionally making someone believe something that is not true	The idea is to be far away on Dec 17th when Russia uses conventional weapons to bomb that missile base in Romania that violates the INF treaty
Inaccurate information/Misinformation	Making an untrue or inaccurate statement unintentionally	There are many good muslins, so hating all of them is not right, but the muslins have to realize that 95% of all terrorist activity is related to people of the muslin faith. so all muslins unfortunately have to bear that burden
Inaccurate information/Disinformation	Intentionally making an inaccurate (fabricated, manipulated, or simply false) statement	He [Obama] can return to Kenya where he was born and run there
Question/Informational	*Informational questions* are asked with the intent of getting information that the asker hopes to learn or use via fact- or advice-oriented answers	Which 'specific' denomination of Christianity did Jesus Himself start? Does that 'specific' denomination still exist today?
Question/Conversational	*Conversational questions* are asked with the intent of stimulating discussion. They may be aimed at getting opinions, or they may be acts of self-expression	Are you hopeful about the future of the United States given the outcome of this election?
Quality/Accuracy	Accuracy of an answer refers to a correct response	Nope. Unless the 22nd ammendent is repealed he is term limited

(*continued*)

(*continued*)

Code	Description	Example
Quality/Completeness	Completeness of an answer refers to an answer that is thorough, provides enough information, and answers all parts of a multi-part question	(In response to a question asking what people think Trump will do as president) Repeal and replace Obamacare. Enforce immigration laws. Reverse Obama orders and rules that are stifling the economy. End wasteful spending. Strengthen the military. Restore US image as world leader. Defeat ISIS. And that's just in the first year
Quality/Relevance	Answer is relevant to the question	(In response to a question asking how the Holy Trinity is composed) God is revealed in three persons--God the Father, God the Son and God the Holy Spirit
Quality/Verifiability	Verifiability of an answer refers to an answer that provides a link or a reference to another source where the information can be found	The Bible tells us, that the Father is Jehovah, Jesus is his 'Firstborn' Son. And the holy spirit, is not a person like God. Rather, it is God's active force. Psalm 104:30

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