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# **Online Ratings and Reviews:**

*Are numerical ratings more persuasive than written reviews?*

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Master thesis, Business Analytics, Marketing and Brand Management

**NORWEGIAN SCHOOL OF ECONOMICS**

This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

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# Abstract

In this thesis, the aim is to investigate the effect of numerical values and words on the consumer decision process. Previous research has studied the effect of online rating and review systems and how they influence consumer behavior and purchase decisions. While some studies have argued that reviews have a greater impact on users, others have argued that rating scores are more important. The main purpose of this study is to question whether participants are more affected by numerical data. In order to understand this relationship, an online experiment was conducted to analyze people's preference on numeral ratings and written reviews and how these two elements in a website affect their behavior. The online experiment with a survey was conducted on 303 participants, mainly NHH students. We tested three types of products: books (Goodreads), restaurants (TripAdvisor) and coffee machines (Amazon). Two dummy pages were created for each product type, one of them had high numerical rating and negative written reviews, the other one had low numerical rating and positive written reviews. Instead of showing all three categories to the participants, they were shown two of them.

Results illustrate that participants prefer the combination of low numerical rating and positive written reviews rather than the combination of high numerical rating and negative reviews. In addition, participants that preferred high numerical rating and negative reviews had higher level of confidence than the other group. Furthermore, we present a nuanced discussion based on the presented results and findings.

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# 1. Introduction

## 1.1 Background

The growth of the internet and digitization have led to the massive availability and importance of online consumer reviews (Alzate, Arce-Urriza & Cebollada, 2022). Online consumer reviews are a form of electronic word of mouth (eWOM) and evaluate mainly a product or a service. It comes in numerical ratings and written reviews or a combination of both. The reviews can be negative, positive or neutral and serve as a feedback mechanism to help consumers with their purchase decisions (Filieri, Hofacker & Alguezaui, 2018). Some of the examples of eWOM could be Amazon and TripAdvisor's rating scale, from 1 being lowest, and 5 being highest rating score, along with the written feedback from customers who purchased the product or experienced the service.

Online consumer reviews can function as an essential information tool for consumers to decrease uncertainty and risk in the decision making process (Kostyra, Reiner, Natter & Klapper, 2016). However, since the internet is constantly evolving and the amount of information increasing, it is getting even more difficult for online consumers to arrive at their decision. The two most common review components are rating scores, often in numbers or stars, and written reviews. These two act as information cues, but they have different influences on people. Rating score can be interpreted as an organized and explicit evaluation on a standardized scale, while written reviews present more context-based explanation and reasoning of consumers' feelings and experiences (Hu, Koh & Reddy, 2014).

Scientists and researchers have studied the psychology of numbers, that human beings have a special mental mechanism for numbers and how small numbers can be easier for humans to process and remember (Milikowski & Elshout, 1995; Wynn, 1998). Furthermore, numbers are associated with facts, accuracy and credibility (Roeh & Feldman, 1984).

The elaboration likelihood model by Petty and Cacioppo (1986) suggest that a message or information can influence people's behavior and attitude in two ways. Through the central route or the peripheral route. The central route processes important information that needs thinking and thorough decision making, however the peripheral route processes information

that is less important and easy. Kahneman (2011) has a very similar approach, and calls these system 1 and system 2 thinking. System 1 thinking is fast thinking and is equivalent to peripheral route processing and system 2 thinking is slow thinking and is equivalent to central route processing.

By integrating the elaboration likelihood model, one can get a better understanding of which of rating scores or written reviews people prefer. There is a difference between high and low involvement people, and how they process information and what they prefer (Rosen, 2000; Bhattacharjee & Sanford, 2006).

## 2. Literature review

### 2.1 The importance of numbers

When people read something, either on the internet, on the TV, or in the newspaper, most would argue that numbers are easier to catch and remember than words. There are several reasons for that. People fixate on numbers because numbers represent facts, which many people depend on. In addition, it is easier to notice numbers rather than words. When there is a sentence or a paragraph full of words, numbers stand out more. Numbers have different shapes and forms than words. Nielsen (2017) also argues that “*numbers often stop the wandering eye.*”

### 2.2 Numerical ratings and written reviews

When buying products online, most people go through different review systems. The main categories we know are ratings and written reviews. However, most review systems consist of both. Review systems' primary purposes are to create value, offerings, and trust for both buyers and sellers. By rating, we mean a numerical rating system. We are probably most familiar with a scale from 1-5, 1-10, or a star rating scale from 1 to 5. The written review provides much more personalized opinions or feelings toward a product or service (Donaker, Kim & Luca, 2019).

### 2.3 Different research on online ratings and reviews

Previously, the research on online ratings and reviews has studied whether people use them and if they have an impact on consumers' purchase decisions. Research in marketing literature argues that online word of mouth plays a significant role in decision-making processes and helps consumers to reduce uncertainty and risk (Olshavsky & Granbois, 1979). Also, by studying the role and importance of reviewers, Hu, Liu, and Zhang (2008) discuss different aspects that can affect online reviews. A study by Hu et al. (2008) found that consumers not only cared about reviews itself but also reviewer quality, reputation, and

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exposure. In addition, it is concluded that online reviews' impact on sales diminishes over time, and companies need to provide incentives to consumers to write reviews.

Studies have shown that sales increase as a function of ratings and reviews of the product rather than the quality of the product. In addition, consumer reviews are shown to significantly impact purchasing decisions (Chen, 2008; Sénécal & Nantel, 2004). Since ratings and reviews act as a tool for voicing opinions, either recommendations or complaints, they are crucial for people when buying products or services. It is also discovered that online purchasing decisions are different for older versus younger adults. A study from von Helversen, Abramczuk, Kopeć, and Nielek (2018) dictates that there is a difference in preferences between the two groups.

Furthermore, multiple meta-analyses from Floyd, Freling, Alhoqail, Cho and Freling (2014) and Purnawirawan, Eisend, de Pelsmacker and Dens (2015) explain that the most important factors influencing sales and consumer attitudes are the review valence and volume. Valence could be understood as consumers' preference carried in the reviews. To illustrate, positive reviews were found to boost consumers' expected quality and attitude toward the product or service, and negative reviews were found to have a damaging impact on the product or service (Baumeister, Bratslavsky, Finkenauer & Vohs, 2001; Fiske, 1980; Maheswaran & Meyers-Levy, 1990; Skowronski & Carlston, 1989; Taylor, 1991). This can be briefly explained by the loss aversion concept from the prospect theory, which illustrates that a loss may feel a lot more significant than a gain (Kahneman & Tversky, 1979).

It is difficult to separate numerical ratings from written reviews because most of the time they are related. However, the study from Hu et al. (2014) argues that "*ratings may have a large indirect effect on sales while sentiments have a more direct effect on sales.*" One of the main reasons for this is that consumers do not have infinite time and attention. They must make choices, and the available choices are plenty. Thus, sorting products based on number ratings would be an excellent option for consumers as it would eliminate the "bad" choices. Reading each review could take much more time than just checking what rating the product has received. Multiple studies on cognitive effort have concluded that people have limited cognitive resources and therefore attend to simple and easy strategies and heuristics to

decide (Newell & Simon, 1972; Payne, Payne, Bettman & Johnson, 1993; Shah & Oppenheimer, 2009; Tversky, 1972; Tversky & Kahneman, 1974).

It is more likely that people will reduce the amount of time and effort spent on making decisions, and therefore the more accessible information will get the attention. Furthermore, Hsee (1996), Shah and Oppenheimer (2008) and Zhang and Markman (2001) suggest that information and choices that are easier to process, such as numbers on standard scale, are seen as more accessible and less demanding to process.

Pavlou and Dimoka (2006) explain in their article that online auction marketplaces have benefited greatly from their online feedback mechanism. They also argue that numerical feedback ratings have gotten a great deal of credit for the online feedback mechanism. Moreover, they discuss that the role of qualitative and narrative feedback has been ignored. As explained earlier, most feedback systems have both numerical and narrative feedback. However, Pavlou and Dimoka (2006) are claiming that much research and studies have ignored the importance of the narrative feedback which comes with the numerical ratings.

The relative importance and persuasiveness of numerical and narrative feedback is still under debate (von Helversen, Abramczuk, Kopeć, & Nielek, 2018). For example, in a consumer review survey from BrightLocal in 2016, it is reported that customers rate average ratings as most important (Murphy, 2016). However, this behavior seemed to have changed.

BrightLocal's consumer survey from 2022 reports that customers rate narrative feedback as most important. Two of the most important review factors are: "the written review describes a positive experience", with 75% and "the review has a star rating", with 58% (Pitman, 2022). Hong and Park (2012) concluded that statistical information and narrative information are equally important and persuasive, while Ziegele and Weber (2015) found that even though average ratings were considered important, narrative feedback seemed more significant than average ratings.

In addition, numbers can function as a heuristic. For example, the number of likes on a specific comment or review can shape users' impressions of the comment or the review. That being said, a review that has many likes can be acknowledged by the people as more popular or dominant than a review that does not have many likes. The quantity of the "likes"

plays a powerful role as an object perspective, as this can shape people to choose the option that has more “likes” (Kim, 2014; Martin, 2012; Pöyry, Parvinen & Malmivaara, 2013).

Hong and Cameron (2014) focuses on understanding of the effects of online comments and heuristic cue to those comments. More specifically the focus is on public perception of corporate crisis news stories online. One of their hypotheses is that: “*Credibility towards online comments will be higher when participants read comments with a high number of “likes” than comments with a low number of “likes”*” (Hong & Cameron, 2014).

Further, it is observed from a paired sample t-test that there was a significant difference between the perceived credibility towards online comments with high and low number of likes. Participants from the study perceived comments with a high number of likes as more credible (Hong & Cameron, 2014). However, one concern would be that the manipulation of the number of likes could be a little too drastic. High number of likes had more than 2000 likes, unlike the low number of likes that had only 0 or 1. It is not difficult to understand that people perceive comments more credible if there is a function that shows how many people “liked” the comment.

Hong and Park (2012) focus on the effect of statistical versus narrative review. They had a 2 x 2 design on positive and negative statistical and narrative evidence. The main focus was to see the persuasive effect on statistical versus negative feedbacks and also on positive versus negative feedbacks.

Two of the hypotheses presented are as follows:

“*H1a. Individuals will perceive statistical reviews as more credible than narrative reviews when vividness is controlled.*”

“*H1b. Individuals will indicate more positive attitudes about a product after seeing statistical reviews than narrative reviews when vividness is controlled.*” (Hong & Park, 2012).

Results from Hong and Park (2012) suggest that vividness does not have any significant impact on review credibility. However, the review type showed a clear difference. Statistical

review was perceived as more credible than the narrative review. In addition, their study shows that participants view negative reviews as more credible than positive reviews. Moving on to hypothesis 1b, Hong and Park (2012) conclude that vividness does not have any effect on attitude about a product, and neither statistical nor narrative reviews have any significant effect on customers' attitude about the product. Credibility towards online comments will be higher when participants read comments with a high number of "likes" than comments with a low number of "likes".

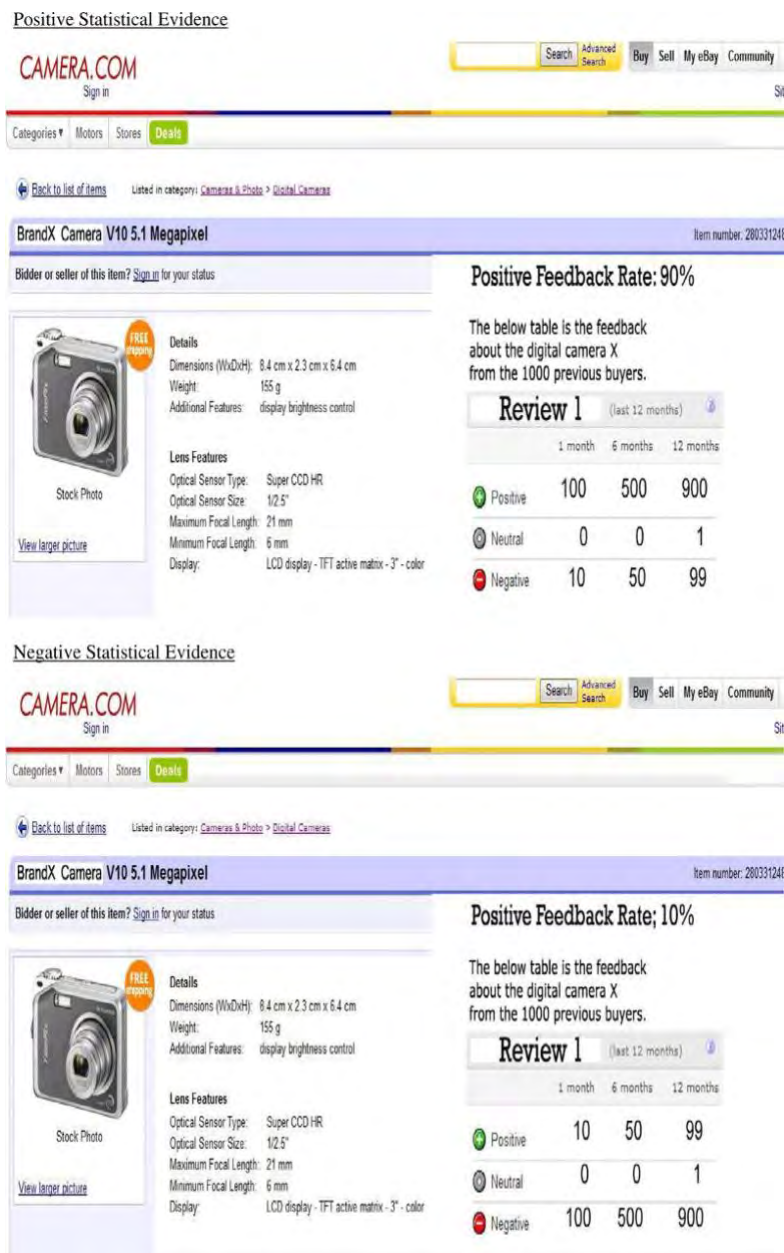


Figure 1: Positive and negative statistical evidence from Hong and Park (2012)



Positive Narrative Evidence

**Review 2** The below is the part of feedback about the digital camera X from the previous buyers.

1000 Feedback received (viewing 1-25)

Feedback	From Buyer
Amazing quality.	Buyer: cwhite5104 (6)
This is not that heavy so that I can carry easily.	Buyer: jimhalew (203 ☆)
This is the one I am looking for.	Buyer: thor_chiok7 (39 ☆)
Beautiful design!	Buyer: kevinp1020 (36 ☆)
It's acceptable.	Buyer: star420_3 (224 ☆)
When I used this at the birthday party, everyone loved their face in the camera.	Buyer: acecharlsika007 (25 ☆)
Nice one. I recommend this to my pals.	Buyer: gsharfy (5)
All functions are fantastic!	Buyer: 7442joem (20 ☆)
This was my anniversary gift and my husband loved it. It works well.	Buyer: susanandrano98 (50 ☆)
NOT BAD	Buyer: tc1015 (66 ☆)
I am pleased with the quality of the picture...	Buyer: nuppei1969 (104 ☆)
Useful product. I am happy with my purchase.	Buyer: pdhner309 (3)
This camera changed my weekend in good way	Buyer: golfer110751 (104 ☆)
I will recommend this to everyone.	Buyer: 2.slo (151 ☆)
Nice appearance, this is what I wanted	Buyer: lljimmy (169 ☆)

Figure 2: Positive narrative evidence from Hong and Park (2012)

Negative Narrative Evidence

**Review 2** The below is the part of feedback about the digital camera X from the previous buyers.

1000 Feedback received (viewing 1-25)

Feedback	From Buyer
Disappointing quality.	Buyer: cxhile5104 (6)
This is so heavy that I can not carry easily.	Buyer: jimhalekw (203 ☆)
This isn't the one I am looking for.	Buyer: thor_chick87 (39 ☆)
Awful design!	Buyer: kevimp1020 (36 ☆)
It's acceptable.	Buyer: star420_3 (224 ☆)
When I used this at the birthday party, no one liked their face in the camera.	Buyer: aceohartslike007 (25 ☆)
Bad one. I can't recommend this to my pals.	Buyer: gshariq (5)
All functions are horrible!	Buyer: 7442joem (20 ☆)
This was my anniversary gift, but my husband hated it.It works badly.	Buyer: susanandrind98 (50 ☆)
NOT BAD	Buyer: tcl101b (66 ☆)
I am not pleased with the quality of the picture...	Buyer: ruppel1909 (104 ☆)
Not useful product. I regret my purchase.	Buyer: pdmer309 (3)
This camera ruined my weekend	Buyer: golfer110751 (104 ☆)
I won't recommend this to anyone.	Buyer: 2 slo (151 ☆)
Disappointing appearance, this is not what I wanted.	Buyer: llyjimmy (169 ☆)

Figure 3: Negative narrative evidence from Hong and Park (2012)

Subsequently, there are some factors to point out. Firstly, Hong and Park (2012) focus the whole study on only one product, as product or service type can differ. In addition, personal preference and involvement towards cameras can affect people's assessment of the reviews. Hence, it would have been better if the study focused on more than only one product. On the other hand, it is great that the product is non-branded. People can have strong attitudes towards different brands, either positive or negative.

In contrast, Ziegele and Weber (2015) tested their hypothesis on: "*The influence of a well-written single customer review will exceed the influence of an aggregate review score.*" They

carried out a 2x2 online experiment where they had a total eight different versions of the made-up websites that showed a positive or negative review, a positive or negative aggregate review score and one of two products (one with high price and high complexity and the other one with low price and low complexity). The brand of the products were fictive so the consumers would not form any positive or negative attitude towards the product.

Additionally, a prototypic and ideal review was designed to be more persuasive, by adding details such as the reviewer's experience with different factual arguments (Ziegele & Weber, 2015).

Finally, they concluded that a positive written review outweighs an aggregate review score and had more impact on purchase intention and recommendation. Furthermore, it was found that these “prototypic” reviews had a stronger direct impact on attitudes and desires related to the product than the aggregated review scores. Not to mention, aggregated review scores did not seem to have any direct impact on the participants’ evaluations of the products (Ziegele & Weber, 2015). The study also claims that if the review is credible and trustworthy, it can guide potential consumers’ purchase decisions even though the rating score is low due to a poor performance or low quality of the product. However, shorter reviews that do not include various arguments do not seem to have much persuasiveness (Hong & Park, 2012).

Filieri, Lin, Pino, Alguezaui and Inversini (2021) focus on visual and verbal cues of electronic word of mouth (eWOM) and how they affect consumer behavior and purchase intention on tourist destinations. They use a travel experience on Tripadvisor as an example to explain the two different cues that are mentioned. Visual cues are user-generated pictures that show the destination (this could be a picture of the product or place), and rankings and rating scores as performance visual heuristics. Verbal cues are written reviews as information quality, and the volume of the reviews as popularity heuristics.

All these four information cues have different impacts on consumers and Filieri et al. (2021) found that performance visual heuristics have a strong positive effect on visit intention and actual visit, while user generated photos showed a significant impact on visit intention and behavior. Popularity heuristics can help consumers to understand which destination is most

visited/popular by looking at the number of the reviews and it is found to have a positive effect on consumers' visit intention and decision. Lastly, even though previous research on information quality has found to have impact on factors such as, perceived usefulness (Cheung, Lee & Rabjohn, 2008; Erkan & Evans, 2016; Filieri, 2015), attitude towards the product (Lee, Park & Han, 2008), perceived review credibility (Cheung, Luo, Sia & Chen, 2009), and purchase intention (Park, Lee & Han, 2007), surprisingly the results from Fillieri et al. (2021) study concluded that information quality did not influence consumers' behavior.

## 2.4 Complexity of the online reviews and ratings

It is already discussed that online reviews and ratings are very powerful tools for consumers to decide whether to purchase a product or a service. And while they might help consumers in a purchasing decision, they might also create conflicts and difficulties. There are hundreds and thousands of different reviews and review platforms on the internet. Moreover, there are other information cues, such as reviewer information and helpfulness rating etc. This huge number of information cues is a challenging factor for those who are looking for information and is a potential threat to information overload (Gottschalk & Mafael, 2017; Jacoby, 1977; Jacoby, Speller & Berning, 1974).

In addition, Maheswari (2019) mentions in her article that just a one-star rating increase in online rating correlates with a 26 percent increase in sales on Amazon. For that reason, many reviews are manipulated, and the most challenging part is to detect the manipulated reviews. There is, of course, a system designed to detect fake reviews, but it is unfortunately extremely difficult to distinguish if a person is genuine or paid to write the review.

There has been an example of people leaving bad reviews and low ratings on purpose in movies. A Facebook fan group decided to sabotage the score of the Star Wars movie and help their new movie with high ratings and positive reviews (Liptak, 2018). Fortunately, it was discovered, but it is not always the case.

Research has shown that ratings and reviews are essential (Chen, 2008; Olshavsky & Granbois, 1979; Sénécal & Nantel, 2004). Additionally, review valence and volume have proven to be important factors (Floyd et al., 2014; Purnawirawan et al., 2015).

On the other hand, it is difficult to determine on what basis consumers gave a product four or five stars. Maybe it is because of the quality of the product or because of the appearance. There is no 100% correct answer on how they emphasize the different factors. Zhu, Guo, and Ren (2022) addressed this issue in their study, where they explain that a consumer rated a hotel 4.3 stars saying the location was good. However, another consumer rated the same hotel 4.5 stars saying the location was not so good and the facilities were not the best. The question is, how did this hotel receive 4.5 stars. Zhu et al. (2022) therein discuss the difficulties of analyzing individual preferences because it requires much more data to analyze.

Another important effect of online review/rating systems is that online product or service reviews and ratings reflect consumers' experience, but also others' ratings. Consumers may also be affected by other social factors, such as the influence of others' reviews, whether it be a completely random user online or friends and family. Hence, the reviews are not free from bias. Additionally, brands and companies can influence online reviews and ratings by their product portfolio. For instance, if a company is known for their expensive products, it will be difficult not to have a bias against the company. Consumers will get swayed by this bias (Moe & Trusov, 2011; Sunder, Kim & Yorkston, 2019).

Instead of categorizing into ratings and reviews, Filieri et al. (2021) categorize them into verbal and visual cues as explained in section 2.3. User-generated pictures are categorized as visual cues and are said to have an impact on consumer behavior and purchase intention. There is a difference between company-generated pictures and user-generated pictures. Consumers perceive user-generated photos as more credible and authentic than company-generated photos that look expensive and unnaturally perfectly arranged (Filieri, 2015; Marder, Erz, Angell & Plangger, 2021).

## 2.5 Why do numbers matter more than words

Milikowski and Elshout (1995) explain the simple psychology of numbers, that each number has a different value. Even children can count the numbers in hours, and people do not need to have much knowledge to process simple numbers. They also argue that small numbers are easier to remember and come to mind more easily. Another interesting study from Wynn (1998) argues that even human infants are capable of processing numbers and perform few numerical computations. There is something special about numbers in general, human beings have a special mental mechanism for numbers. The study explains that already at the five months of age, infants are able to process small numbers, before even learning how to talk or walk, and obviously read. Finding from the study supports that there is a “*dedicated mental mechanism specific to number, one which may have evolved through natural selection.*” This special mechanism is considered as a foundational core for our numerical knowledge (Wynn, 1998).

Study from Koetsenruijter (2011) explains that use of numbers in news increases credibility by briefly mentioning the ethos concept by Aristotle. Ethos is regarded as the most powerful persuasion method by Aristotle. Koetsenruijter (2011) presented two different versions of news articles, one containing precise and absolute numbers, the other one with different indicators, such as “some, a lot” etc. Results from the experiments confirm that numbers influence a higher score of credibility and more numbers makes an article even more credible. More interestingly it is also discussed that since numbers provide an impression that it is accurate and precise, they are used because of this impression and not by what these numbers actually provide.

Additionally, another study from Roeh and Feldman (1984) has proved that numbers are seen as an important tool for accuracy and credibility. Not only do they provide factual evidence, but numbers are also used because of their rhetorical effect. Many participants from van Witsen (2018) study believe that numbers hold a special status, by simply being numbers. Some of them said that numbers were more difficult to refute and that numbers somehow had more truth behind them. The impression that numbers contribute to facts-journalism is also supported by Roeh and Feldman (1984). By knowing how to use numbers,

rather than how often, numbers can be used as a powerful rhetoric tool. Rhetoric tools such as contrast, repetition and symmetry contribute to emotional response.

Cohesive (2021) argues that numbers trigger many emotions, such as admiration, inspiration, suspicion, caution, as well as panic and aggression. There is a perception that many people believe, we are somehow led to believe that numbers always speak facts and do not lie, even though it is always not the case.

## 2.6 When do numbers matter more than words and vice versa?

We believe that there are many different situations and factors that influence the outcome of if numbers matter more than words and vice versa. The elaboration likelihood model (ELM) can be used to explain when numbers might matter more than words and the opposite way. The foundation of ELM is that the elaboration context is based on people's ability and motivation to think and process different information (Petty & Cacioppo, 1986). Briefly, with high ability and motivation, the elaboration likelihood is high, meaning people are able and willing to assess the information more thoroughly. With low ability and motivation on the other hand, the elaboration likelihood is low and therefore, people do not assess the information as thoroughly and arrive at their decisions easier and faster. ELM says that messages are processed through either central or peripheral route. What messages that go through the central route will be different for individuals as we all have different motivation, ability, and opportunity. If the message is important and the involvement is high, the message will go through the central route. If the message is less important and the receiver has low motivation, ability and opportunity, the message will go through the peripheral route (Petty & Cacioppo, 1986).

Moreover, the central route and the peripheral route can be linked as system 1 and system 2 thinking. System 1 thinking can be associated with the peripheral route, which works automatically and quickly, while system 2 thinking can be associated with the central route, which requires more processing and effort (Kahneman, 2011). Respectively, they are also called fast and slow thinking. The combination of system 1 and 2 thinking helps our brain to work more efficiently. However, human beings are not perfect and not always 100%

rational. Since system 2 thinking requires more thinking and energy, we get tricked into making mistakes because our mind is mentally lazy and wants to think fast and arrive at the decision quicker.

Marsh and Rajaram (2019) in their article discuss the implications of internet usage for human memory and cognition. They discuss different properties of the internet that affect our memory and cognition. The amount of information available online is infinite, and many people rely heavily on the internet. Because of the amount of information that is available, it is definitely more difficult to choose between the information and choices, and more importantly, the internet is extremely fast and accessible, which makes new information even more accessible constantly. Since most people nowadays have smartphones and computers, they can search anything and everything when they wish (Marsh & Rajaram, 2019).

Combination of the circumstances make it even more difficult for people to decide. Human beings simply do not have capacity and capability to process the infinite information that is available on the internet. We have limited time and resources and using system 2 thinking to process and absorb the information would take an extremely long time. Because of the sheer amount of information that is accessible and people not having capacity and capability to assess every information, it is much harder to evaluate the quality of internet sources. Fact checking and thorough evaluation of the sources would take especially long time, and hence it becomes easier to depend on system 1 thinking and arrive at the decision much quicker (Braasch & Bråten, 2017), such as number or star ratings, since they can help simplify the size, amount and complexity of the information that is available and shorten their time to arrive at the optimal solution (Park and Nicolau, 2015). Since reading through the written reviews demands more time and energy, our mind could get tricked into choosing the ratings because it is easier to process simple number ratings.

Study from Park et al. (2007) found out that low involvement consumers care more about the quantity of the reviews rather than quality of the reviews. However, high involvement consumers care about the quantity of the reviews mainly when the quality of the reviews are high. A possible explanation for this is that low involvement consumers are not interested to



spend much time and therefore base their decisions on the volume of reviews rather than focusing on the actual quality of the reviews. (Park et al., 2007)

Several studies have proposed that perceived credibility of the information source is one of the most important peripheral cues while argument quality is regarded as one of the most important factors in central route persuasion (Mak, Schmitt & Lyytinen, 1997). Additionally, research has studied the effects of source credibility and argument quality on people's information processing. It is found that a person with high elaboration (central route) is constantly influenced by argument quality while a person with low elaboration (peripheral route) is always influenced by source credibility (Bhattacharjee & Sanford, 2006; Rosen, 2000).

Petty and Cacioppo (1986) argue that high elaboration is the central persuasion route, and low elaboration is the peripheral persuasion route. In other words, messages that seem more important would go through the central route, and other less important messages would go through the peripheral route. Di Blasio and Milani (2008) illustrate that there is a difference in persuasion in face-to-face communication versus online communication. They believe that online communication would allow more access to the central path of information elaboration, since there are less verbal and non-verbal signals that could distract the message. Hence, they claim that people communicating online would have more time to think and assess the messages.

This hypothesis led to their study, in which they tested if online communication would allow more access to the central path of information elaboration. In their study, face to face communication was based in a lecture hall of a university, while online communication went through an online chat system. Participants were asked to choose between two alternatives and later presented with another argument that could change their minds. Nevertheless, the results showed that opinion change was higher in face-to-face communication than online communication. Explanation for this could be that people that were engaging in face-to-face communication could have activated the peripheral route persuasion in the beginning, and therefore did not make a comprehensive decision in the first place, resulting in changing their mind after hearing the second argument (Di Blasio & Milani, 2008).

Moreover, Di Blasio and Milani (2008) argue that participants in the online chat room had less distraction, and therefore had more time to process and consider between the choices in the beginning, using the central route.

Yang (2015) argues in her article that framing could become a peripheral cue and will work effectively for people that do not have motivation or knowledge to process information (low involvement). Peripheral cues can be explained as simple stimuli that can affect attitudes without high processing or thinking. Furthermore, the study says there is no difference in purchase intention between high elaboration and low elaboration. However, there seems to be higher purchase intention in high elaboration than low elaboration when there is a positive peripheral cue. This means that when both high elaboration and low elaboration groups are presented with a positive peripheral cue, there will be higher purchase intention on the high elaboration group. On the other hand, there is no difference in purchase intention between high and low elaboration if there is a negative peripheral cue. For example, a peripheral cue could be a framing message, such as “90% of people who bought this product are satisfied” (positive peripheral cue), or 10% of people who bought this product are dissatisfied (negative peripheral cue) (Yang, 2015).

Subsequently, we think that low involvement toward the product or service and high involvement toward the product and service relate to low elaboration and high elaboration, meaning that low involvement consumers will spend less time when processing the relevant information, and high involvement consumers will spend more time and think more consciously. As explained earlier, it is already mentioned that numbers are easier to notice and therefore give a reason to believe that low involvement consumers choose numbers over words because it is visibly easier to read than a sentence full of words. In addition, our study encourages people to read carefully and ask them to take their time before deciding. The study urges people to focus and therefore involve themselves more to the process than in a normal situation.

## 2.7 Prediction and hypotheses

One prediction would be that urging participants to focus and involve themselves more to the study will have an impact on the results. Not everyone, but some will read the ratings and reviews more carefully and pay more attention to the study. This can have an impact on participants' preferences on ratings versus reviews. Additionally, participants who prefer reviews over ratings would spend more time on the study as they pay more attention to the study and its details. This is also a limitation of the study also mentioned by Ziegele & Weber, 2015. They pointed out that participants were forced to concentrate and pay more attention to the product and its reviews, which may differ from an actual buying situation. For this reason, it may improve the actual impact of the review. Thus, the following hypotheses will be tested in our study:

H1: Numerical ratings will have an overall more positive effect on product evaluations than written reviews.

H2: The effect postulated in H1 will be moderated by consumers' time spent on the website. The positive effect of numerical ratings (vs. written reviews) on product evaluations will be stronger for those who spend less time on the website.

H3: Participants whose choices are influenced by numbers will be more confident about their decision.

### 3. Research methodology

In this section our research design will be presented, along with population and sample, stimuli and questionnaire and measurement.

#### 3.1 Research design

In this thesis, we will employ a quantitative research method, more specifically in the form of an online experiment. This study aims to examine the relationship between peoples' preference in numerical ratings and written reviews and other factors that affect their decision. The designed experiment was a survey carried out on the internet since it was the most appropriate way to collect the data in a limited amount of time (Finley & Penningroth, 2015).

The research design in this experiment will be a within-subjects design. Each participant will be exposed to both conditions (high rating and positive reviews, and low rating and negative reviews). There will be three different product categories: books, coffee machines, and restaurants. Participants will only be exposed to two of the three categories for both conditions. Within-subject design is more practical and beneficial for us since it requires fewer respondents because all participants will be exposed to both treatments. However, an order effect is a possible threat to the experiment. Order effects refer to the responses being different because of the order of the treatments the participants are exposed to. In order to prevent it, we choose to randomize the products so that the participants are exposed to different products and treatments in a randomized order (Charness, Gneezy & Kuhn, 2012; Saunders, Lewis & Thornhill, 2019).

There are other possible threats to the within-subject design, with demand effects being another. Demand effects are when participants try to satisfy the experimenter's expectations and therefore try to provide answers accordingly (Charness et al., 2012). We attempted to prevent this by not fully revealing the purpose of the study to the subjects. Instead of revealing to the participants that we want to determine their preferences between numerical ratings and written reviews, we expressed that we want to find out their opinions on different products. Further, we identified that familiarity or fatigue effects could influence the

outcomes. Same appearance and names for both conditions could cause boredom, tiresomeness, and disinterest in participants. Hence, we decided to slightly adjust the appearance and names of the products. Moreover, to further prevent the familiarity and fatigue effects, we decided that it would be best if participants were exposed to two products, instead of three. (Lavrakas, 2008; Saunders et al., 2019).

To test if actually numerical ratings or written reviews led to change in preferences, a counterbalanced design was employed. Even though we tried to prevent the familiarity and fatigue effects by adjusting the appearance and names of the products, there was a possibility that participants chose certain products because of the appearance or name, simply preference-based decisions. Both conditions that subjects were exposed to were counterbalanced. For example, product A with condition 1 (high rating and negative reviews), and product B with condition 2 (low rating and positive reviews). With the counterbalanced design, we changed the products, so product A had condition 2 and product B had condition 1.

See illustration below.

Product A	Product B
High rating and negative reviews (condition 1)	Low rating and positive reviews (condition 2)

*Table 1: Illustration of both conditions*

Product B	Product A
High rating and negative reviews (condition 1)	Low rating and positive reviews (condition 2)

*Table 2: Illustration of both conditions (counterbalanced design)*

There is no control group in our experiment, since all participants are assigned into one single group and will undergo the same experimental protocol. Our two independent variables are high numerical rating & negative written reviews and low numerical rating & positive written reviews. The dependent variable in this study will be the participants' choices.

## 3.2 Population and sample

As we wanted to learn more about people's preferences in the online review system, mainly numerical ratings versus written reviews, we did not have any age limit, gender, nor background etc. However, we set the minimum age of the experiment to young adults (18 years of age). We did not demand any knowledge, familiarity nor interest in any of the review platforms and product categories. Our primary distribution channel was NHH's canvas, mainly Meeting Point - Master channel, and NHH-news channel. To further extend the study's range, the link to the study was also posted on Facebook as well.

There were in total 303 respondents in the survey, where 204 of them completed the whole survey. Out of 204 participants that completed the survey, 46,23% of them were female, and 53,27% male. The age range was very diverse, with 40,2% of them being 18-24, followed by 25-34 with 28,64%, 45-54 with 10,55%, 35-44 with 10,05%, 55-64 with 8,54% and lastly 65 or older with 2%.

## 3.3 Stimuli

In the first part of the experiment, subjects were randomly exposed to one of the three product categories (Amazon: coffee machines, Goodreads: books, TripAdvisor: restaurants). Participants were exposed to both conditions after each other, and then asked simple questions regarding their choices. Questions will be addressed in the 3.4 questionnaire and measurement section. In the second part of the experiment, after the questions, participants were then randomly exposed to one of the two remaining product categories. Here as well, the subjects were exposed to both conditions followed by questions.

Both conditions' basis was identical in all three product categories. Even the products were not the same, they all had either high numerical rating with negative written reviews, or low numerical rating with positive written reviews. In order to make the dummy web pages as real as possible, multiple elements were included, such as product name, pictures of the products, reviewers' names, reviewers' profile photos, review volume etc. On TripAdvisor restaurants, even restaurants' addresses and numbers were included. With coffee machines

on Amazon, we included the price and technicalities as well. Furthermore, books on Goodreads had longer written reviews. The main reason for adding these elements was to create a dummy web page that was as realistic as possible.

### 3.3.1 TripAdvisor

TripAdvisor is a user-generated content website that gathers and publishes customer reviews on hotels, restaurants, and other travel-related services (Mayzlin, Dover & Chevalier, 2014). TripAdvisor attracts over 140 million monthly visits and contains approximately one billion reviews and opinions from users (Statista, 2022b).

While selecting information such as name, photo, address, and phone number of the restaurants, some rules were taken into account in order not to affect the users with these elements. For the restaurant name, two names with the same length and language were chosen. The addresses and phone numbers of the restaurants were generated for the same country and city via an online random address generator website. Since the visual element of products and services is known to have a high impact on the customer, it has been tried to keep this effect the same in both restaurants. For this reason, two different restaurant photographs were selected, with the same seating arrangement and chair structure, dominated by white and light color tones. For the reviewers' profile photo, 2 different photos of the same tourist location with the same colors and lights have been used, and for the usernames, different combinations of numbers were added to the beginning or end of the same names. In this way, the variables, except ratings and reviews, were controlled to create the same effect for the respondent on two separate web pages. It is important to ensure that the ratings and reviews have the same negative or positive values for both pages. While 3 stars out of 5 stars were chosen for the low rating, 4.5 stars were chosen for the high rating. It has been decided that the comments should contain the same character length so that the reading speed and rate are kept constant for both pages. As an example, for the TripAdvisor restaurants, the sentence "Food was good and tasty" was used in a positive review, while on the other page "Food was bad and tasteless" was used as a negative review. In this way, it was ensured that the words in the reviews have the same negativity and positivity in terms of sentiment.

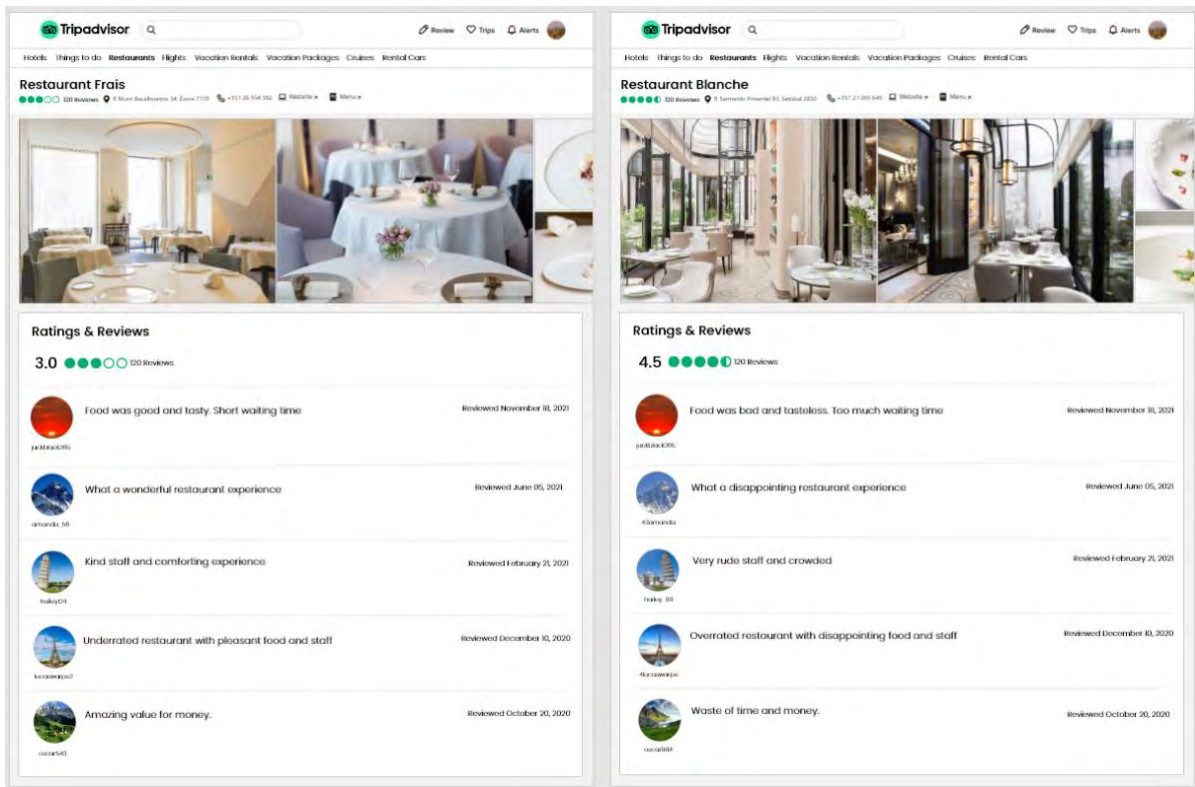


Figure 4: First set for TripAdvisor pages created for the study

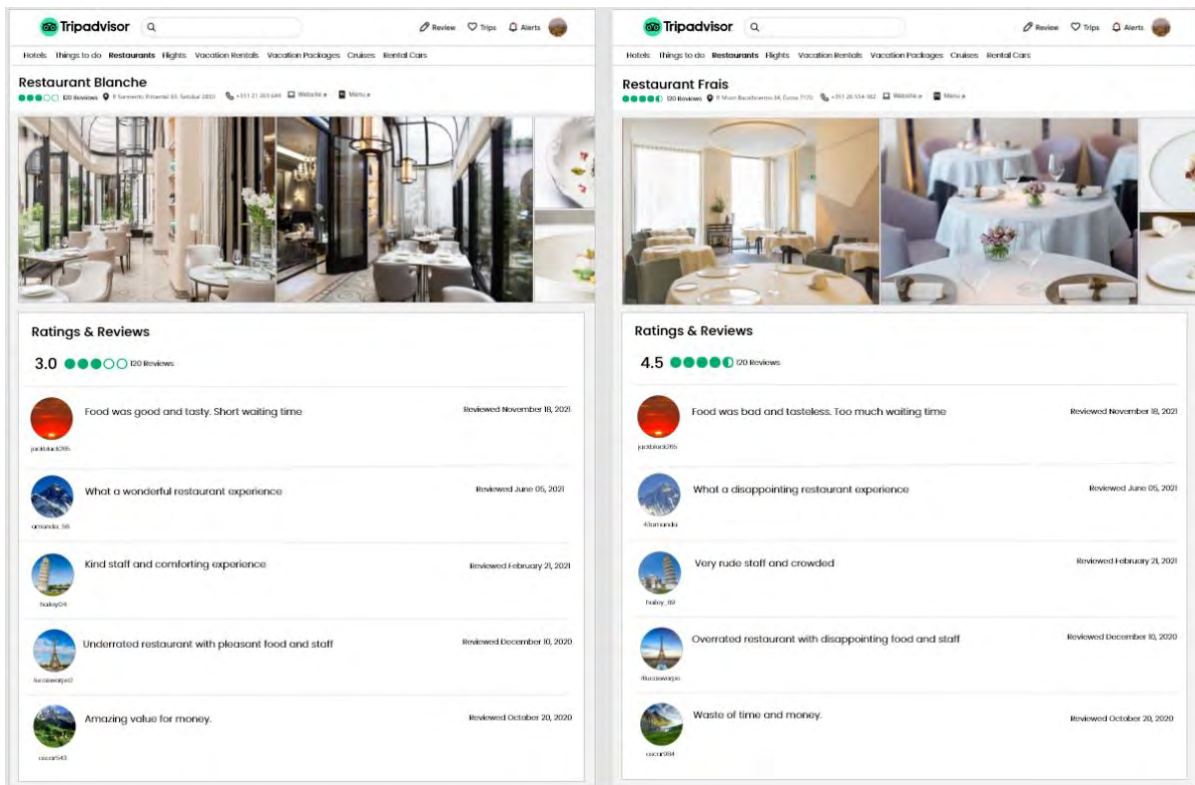


Figure 5: Second set for TripAdvisor pages created for the study



### 3.3.2 Goodreads

Goodreads is a book-focused website that allows users to log their reading and submit book reviews. According to the most recent data, the online book review service had over 90 million book reviews published by users in July 2019 (Smith, 2022; Statista, 2022a). In order to create a page view that imitates an authentic Goodreads content page, the elements of a book title, book cover, author name, book description, rating, reviews, username, and profile pictures have been used. To avoid any association with a book that is available in the market among respondents, two non-existent books have been created for this study. The genre of both of these books was decided to be romantic. Both of the book covers include an illustration of 2 people, a monochrome background, and a book title in a calligraphic font. Book names were chosen to be similar to create the same feeling in respondents. The most common name and surname in English have been chosen for author names, while the book description was kept identical. As on TripAdvisor pages, different number combinations are added to the beginning or end of the same names for the usernames, and the photographs of people with the same pose, facial expression, and features are used as user profile photos. Thus, it is aimed to ensure that the perception of the participants towards the books is not affected by the book cover or the similarities of the commenters to themselves. Unlike TripAdvisor pages, it has been decided to use longer reviews on Goodreads pages. Thus, during the same study, it is aimed to observe whether the length of the comments will make a change in the selection. Just like on TripAdvisor pages, it is ensured that the comments are both in the same context and on the same negative or positive scale.

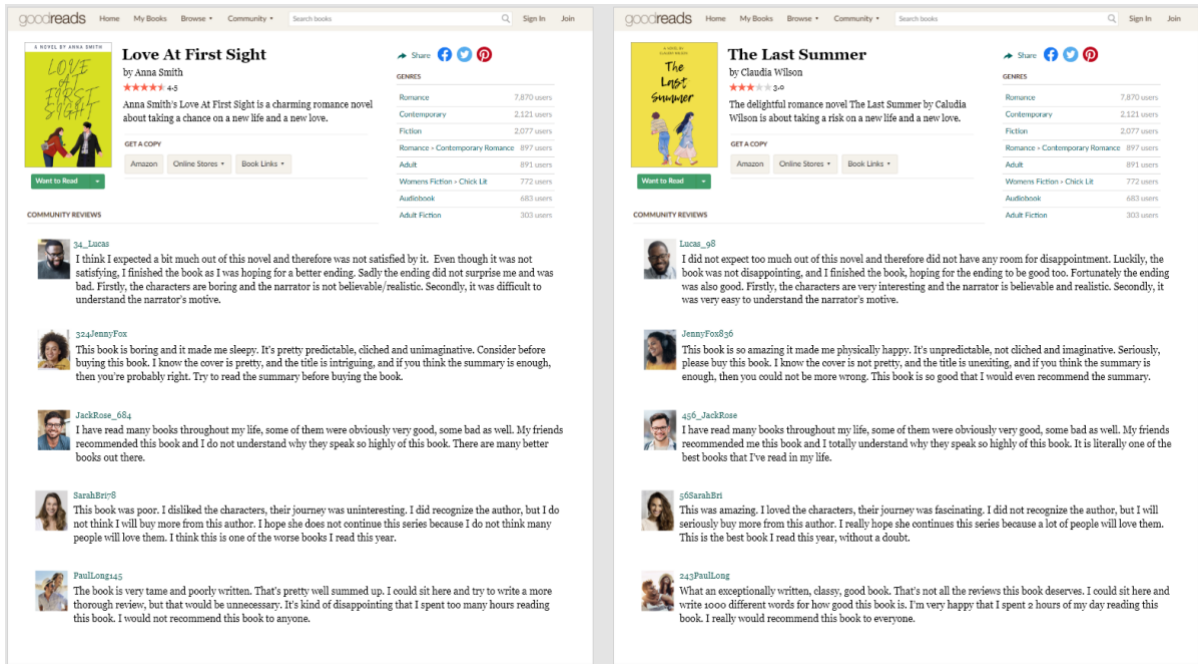


Figure 6: First set for Goodreads pages created for the study

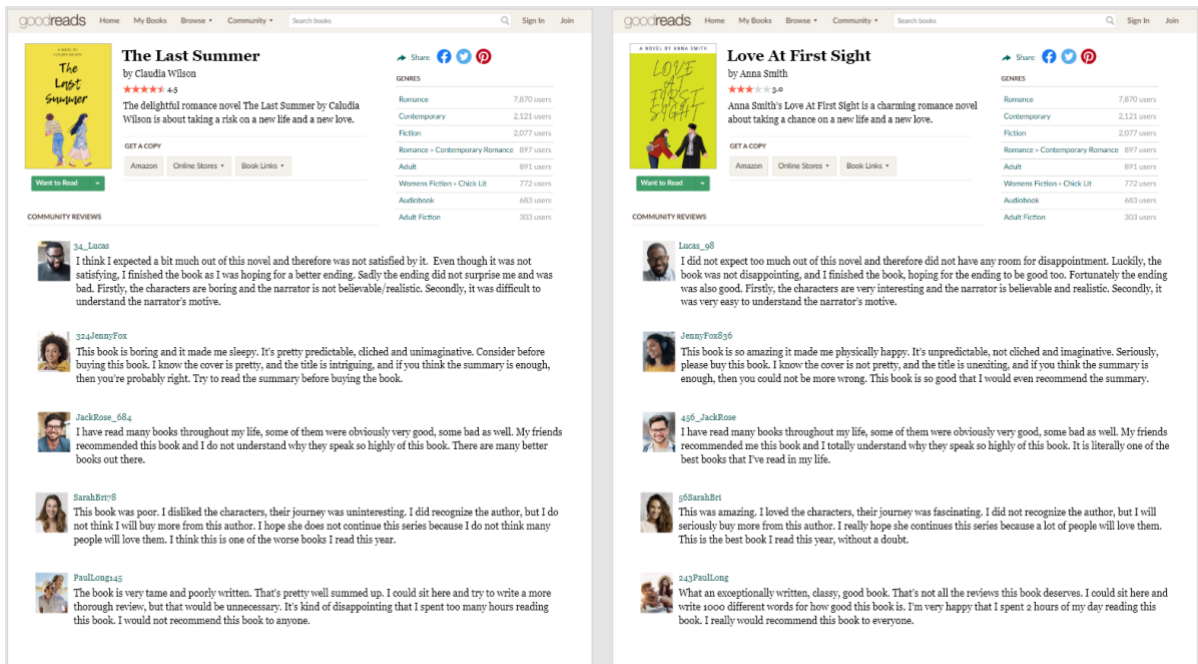


Figure 7: Second set for Goodreads pages created for the study

### 3.3.3 Amazon

Amazon is one of the biggest e-commerce websites with over 2 billion visits per month (Statista, 2022c). Amazon allows consumers to rate and review the products that they purchased from their platform. This platform was chosen because it has an interface that the

participants are mostly familiar with. The created product pages for Amazon include the name, image, and technical specifications of the product. In addition, username, user profile picture, rating, and review content are also included on this page. While creating dummy product pages, coffee machines with simple filtering types were chosen as the product. The reason for this was that the participants were generally familiar with this type of product, and it was thought that intense personal observations would not be experienced. Two product images with the same color and product silhouette were selected as the product image. It was also considered that the brands of these products do not have a high customer volume. The product name and technical specifications on the pages are the same. For usernames, alternative number combinations are added to the beginning or end of the same names, and images of people with the same pose, facial expression, and features are used as user profile photos. It was decided to have reviews that are relevantly shorter than Goodreads reviews, meanwhile longer than TripAdvisor ones. Therefore, it is also aimed to see the effects of different length reviews in this study.

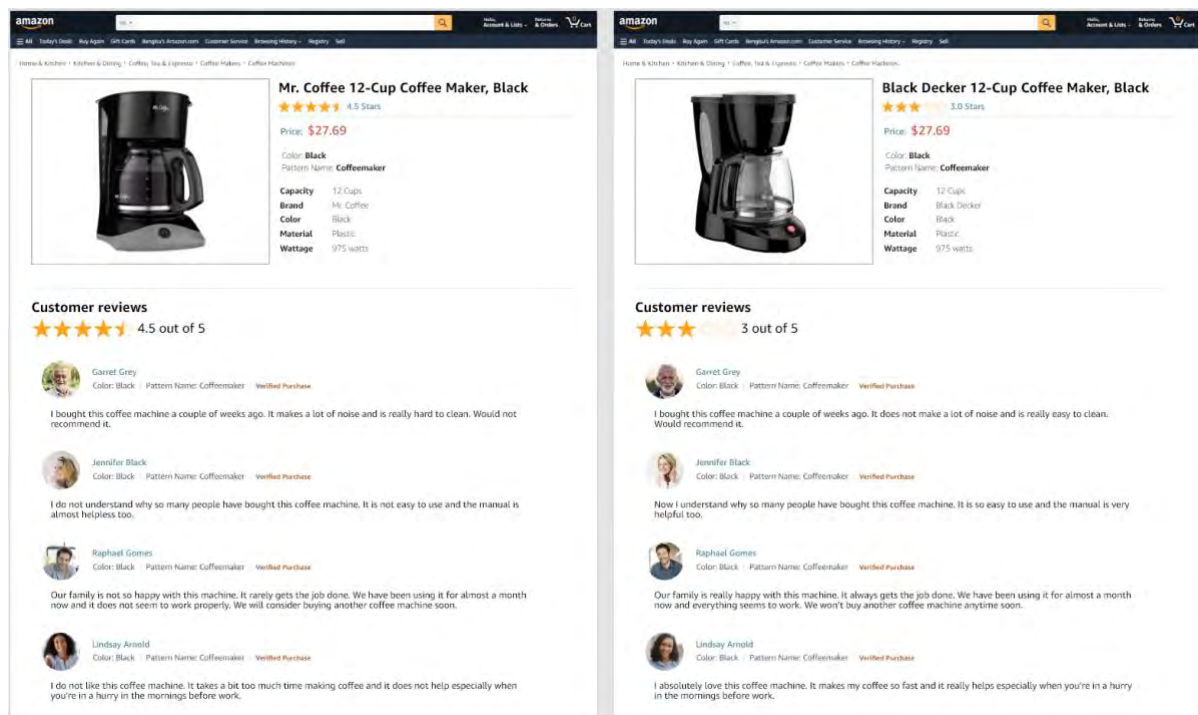


Figure 8: First set for Amazon pages created for the study

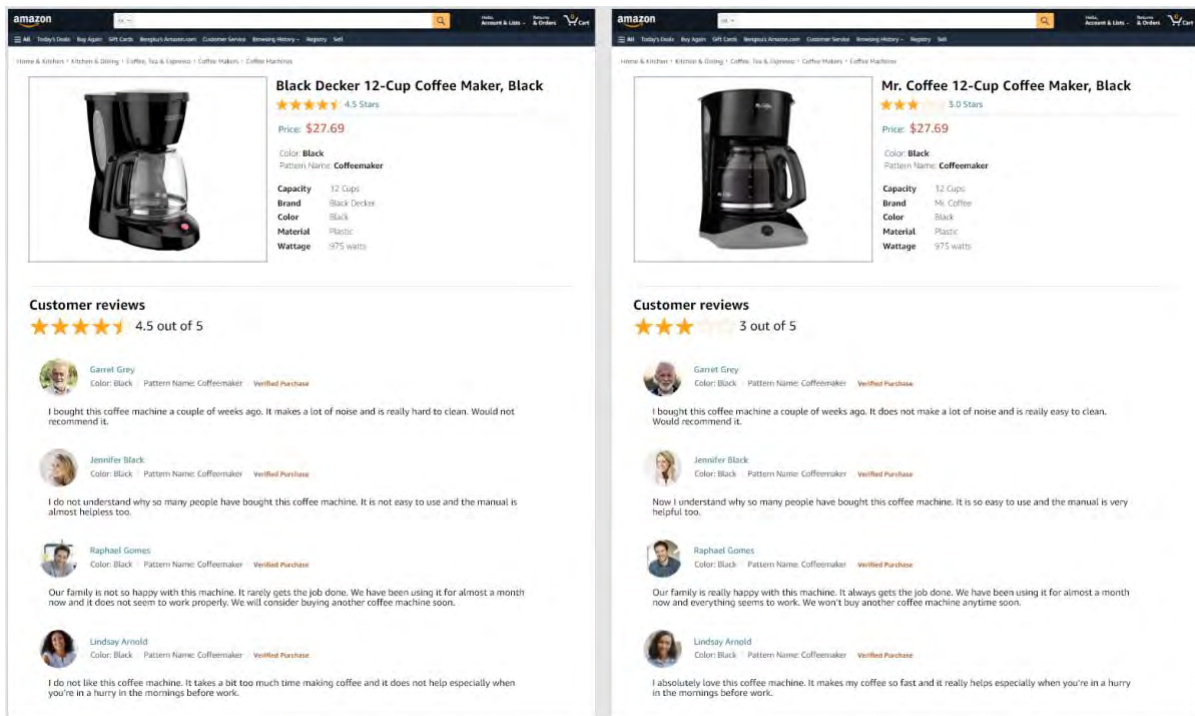


Figure 9: Second set for Amazon pages created for the study

### 3.4 Questionnaire and measurement

For the questionnaire and measurement, Qualtrics was employed. The questionnaire was in English to aim for more participants with regard to the fact that there are many international students at NHH. Please check Appendix A for the original survey. Participants were welcomed with a consent form where we briefly introduced the study and emphasized that the responses will be completely anonymous. To continue the survey, participants had to agree that they were older than 18 years old as well.

After the consent form, we had an attention check to filter out “careless” respondents that could potentially harm the result of the study (Kung, Kwok & Brown, 2018). Respondents were asked what their favorite drink between four options was. Orange juice, coffee, tea, hot chocolate were the four options, and to pass the attention check participants were informed to choose both orange juice and tea. Even though not all participants passed the attention check, they were still able to continue the survey.

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Moving on, after the attention check, participants were exposed to the different conditions of the product categories. The order was completely randomized, which means that one participant got TripAdvisor first while another participant got Goodreads first. In addition, we put a time record function on each condition so we could measure how much time participants spent on viewing each treatment.

Afterwards, the participants were asked “on a scale from 1 = "I do not agree at all" to 7 = "I strongly agree", to what extent do you agree on the following statements?” The statements were slightly different due to different product categories. We will call this the follow up question from now on. This question was asked after the first condition, and the participants were exposed to the other condition. After the second condition they were asked the follow up question again. The follow up question was asked in order to get a better understanding of their perceptions and attitude towards the product they viewed. Then, they were asked to choose which product they preferred, based on the two shown conditions, followed up by a 5-point scale question on how confident they were in their product choice, with 1 being lowest and 5 highest. Finally, the participants were asked a 5-point scale question on what factors that affected their decision on 1 being no impact and 5 being most impact. The purpose of this question is to understand which of the elements have the most impact when decision making, and especially their attitudes towards ratings and reviews aspects.

This same procedure was repeated with another product category. Condition 1 followed up by follow up questions with a 7-point scale. Then condition 2 followed up by the same follow up questions with a 7-point scale. After both conditions and both follow up questions, participants were once again asked which product they preferred, followed by a 5-point scale question on the confidence in their choice. Not to mention, the final question with a 5-point scale on different factors that influenced participants’ decision. Please see below for survey questions:

7-point scale questions on to what extent the participants agree to the statements. 1 = "I do not agree at all" to 7 = "I strongly agree":

Follow up question statements for TripAdvisor pages:

- I have a positive attitude towards this restaurant.

- The quality of this restaurant is high.
- The quality of food is high in this restaurant.
- The service of this restaurant is good.
- This restaurant has a good ambiance.

Follow up question statements for Goodreads pages:

- I have a positive attitude towards this book.
- The content quality of this book is high.
- The author of this book is a good writer.

Follow up question statements for Amazon pages:

- I have a positive attitude towards this coffee machine.
- The quality of this coffee machine is high.
- The design and look of this coffee machine is good.
- The technical specifications of this coffee machine are good.

5-point scale question on what factors affected the participants. 1 = "It did not affect my choice at all" to 5 = "It affected my choice the most":

Final question statements for TripAdvisor pages:

- Appearance of the restaurant
- Name of the restaurant
- Rating score
- Reviews

Final question statements for Goodreads pages:

- Cover of the book
- Title of the book
- Rating score
- Written reviews

Final question statements for Amazon pages:

- Physical appearance of the coffee machine
- Brand of the coffee machine
- Rating score
- Reviews
- Technical features of the coffee machine

When participants were done with two product categories and all the questions, they were asked simple age and demographic questions. They were asked to state their gender, followed by their age and the highest degree or level of completed education. As stated earlier, the survey was designed on Qualtrics. It was distributed April 28th and we decided to close the survey May 16th and extracted the data set afterwards.

To analyze the data that is collected throughout this study the programming language R has been decided to use. R, a programming language, was used to clean, organize, and analyze the data. Statistical analyzes such as chi-square test, biserial correlation, ANOVA and Pearson's correlation test were performed with R and a model was created using linear and logistic regression at the same time. With this analysis, we investigated the hypotheses mentioned earlier.

## 4. Survey results

303 people participated in the survey and 163 of these 303 people answered the attention check question correctly. Therefore, the results were divided into two separate groups, those who passed the attention check and those who failed the attention check. Thus, it will also be discussed how the results of people who give a wrong answer to a specific attention-focused question change according to the results of people who pay attention to the survey.

### 4.1 Goodreads Passed Group

By passed group, we refer to the group that passed the attention check in the beginning of the test. In set 1, a book named The Last Summer with high rating and negative review was exposed to the participants first. Total votes for The Last Summer was 12. The second condition was a book named Love at First Sight, with low rating and positive reviews. Total votes for the second condition was 23 votes.

Participants who picked book 1 (The Last Summer) with high rating and negative reviews, spent on average 38.26 in the first condition (The Last Summer), and 21.04 seconds in the second condition (Love at First Sight), which had low rating and positive reviews.

Respondents also answered a series of questions about their opinion on the books. In table 3, the means for each question can be seen. Numbers are average scores on a scale from 1-7

	<b>Book 1 (high rating and negative reviews)</b>	Book 2 (low rating and positive reviews)
I have a positive attitude towards this book	5.583	2.833
The content quality of this book is high	5.75	3.167
The author of this book is a good writer	6.083	2.917

*Table 3: Means of respondents' answers on books for the group who picked book 1*

Participants who picked book 2 (Love at First Sight) with low rating and positive reviews, spent 69.23 in the first condition (The Last Summer), which had high rating and negative



reviews, and 38.812 seconds in the second condition (Love at First Sight). In table 4, the means for each question can be seen. Numbers are average scores on a scale from 1-7

	Book 1 (high rating and negative reviews)	Book 2 (low rating and positive reviews)
I have a positive attitude towards this book	2.348	5.174
The content quality of this book is high	2.478	5.304
The author of this book is a good writer	2.739	5.348

*Table 4: Means of respondents' answers on books for the group who picked book 2*

After participants made their choice, they were asked several questions about how they feel about their decision and what affected their decision. In table 5, the means of the questions can be seen for each decision. Numbers are average scores on a scale from 1-5.

	Participants who picked high rating and negative reviews	Participants who picked low rating and positive reviews
Confidence	4.333	3.783
Cover of the book	1.5	2.217
Title of the book	2.25	2.261
Rating score	4.5	2.913
Reviews	2.5	4.696

*Table 5: Means of respondents' answers on attributes that affected their decision grouped by their choice*

In the second set of the Goodreads group, The Last Summer with low rating and positive reviews was exposed first and had 32 votes. Love At First Sight with high rating and negative reviews was the second condition and got 10 votes. Books were still the same, but

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only the rating and reviews were flipped. The Last Summer in set 1 had high ratings and negative reviews, meanwhile in set 2, it has low ratings and positive reviews.

Respondents who picked book 1 (The Last Summer) with low rating and positive reviews spent on average 105.61 seconds in the first condition (The Last Summer), and 46.366 seconds in the second condition (Love at First Sight), which had high rating and negative reviews. In table 6, the means for each question can be seen. Numbers are average scores on a scale from 1-7.

	<b>Book 1 (low rating and positive reviews)</b>	Book 2 (high rating and negative reviews)
I have a positive attitude towards this book	5.469	2.719
The content quality of this book is high	4.906	2.719
The author of this book is a good writer	4.938	2.938

*Table 6: Means of respondents' answers on books for the group who picked book 1*

Respondents who picked book 2 (Love at First Sight) with high rating and negative reviews spent on average 18.06 seconds in the first condition (The Last Summer), which had low rating and positive reviews, and 12.156 seconds in the second condition (Love at First Sight). In table 7, the means for each question can be seen. Numbers are average scores on a scale from 1-7.

	Book 1 (low rating and positive reviews)	<b>Book 2 (high rating and negative reviews)</b>
I have a positive attitude towards this book	3	5.50
The content quality of this book is high	2.8	5.20
The author of this book is a good writer	3.1	5.30

*Table 7: Means of respondents' answers on books for the group who picked book 2*

After participants made their choice, they were asked several questions about how they feel about their decision and what affected their decision. In table 8, the means of the questions can be seen for each decision. Numbers are average scores on a scale from 1-5.

	Participants who picked low rating and positive reviews	Participants who picked high rating and negative reviews
Confidence	3.469	3.90
Cover of the book	1.688	2.4
Title of the book	1.844	2.2
Rating score	2.969	4.6
Reviews	4.469	2.40

*Table 8: Means of respondents' answers on attributes that affected their decision grouped by their choice*

From both sets, we can see that the book with low rating & positive reviews got more votes. People preferred the book with lower rating and positive reviews rather than the book with higher rating and negative reviews. It seems like participants that chose the book with low rating and negative reviews spent more time choosing between the books. From the set 2, participants that picked book 1 (low rating & negative reviews) spent approximately 106 seconds looking through the first page (low rating & negative reviews) and 46 seconds looking through the second page (high rating & positive reviews). In comparison, the participants that picked book 2 (high rating & positive reviews) spent 18 and 12 seconds respectively. Lastly, when participants were asked about the confidence in their choice, the rating is lower on the participants that chose the low rating and positive reviews on both sets.

## 4.2 Tripadvisor Passed Group

In set 1, Restaurant Blanche with high rating and negative review was exposed to the participants first. Total votes for Restaurant Blanche was 13. The second condition was Restaurant Frais with low rating and positive reviews. Total votes for the second condition was 29 votes.

Participants who picked restaurant 1 (Restaurant Blanche) with high rating and negative reviews spent on average 20.396 seconds in the first condition (Restaurant Blanche), and 11.739 seconds in the second condition (Restaurant Frais), which had low rating and positive reviews. Respondents also answered a series of questions about their opinion on the restaurants. In table 9, the means for each question can be seen. Numbers are average scores on a scale from 1-7.

	<b>Restaurant 1 (high rating and negative reviews)</b>	Restaurant 2 (low rating and positive reviews)
I have a positive attitude towards this restaurant	5.538	3.077
The quality of this restaurant is high	5.615	3.077
The quality of food is high in this restaurant	5.385	2.846
The service of this restaurant is good	5.538	2.538
This restaurant has a good ambiance	5.692	3.615

*Table 9: Means of respondents' answers on restaurants for the group who picked restaurant 1*

Participants who picked restaurant 2 (Restaurant Frais) with low rating and positive reviews spent on average 31.523 seconds in the first condition (Restaurant Blanche), which had high rating and negative reviews, and 16.533 seconds in the second condition (Restaurant Frais). In table 10, the means for each question can be seen. Numbers are average scores on a scale from 1-7.

	Restaurant 1 (high rating and negative reviews)	Restaurant 2 (low rating and positive reviews)
I have a positive attitude towards this restaurant	2.379	5.655
The quality of this restaurant is high	2.517	5.034
The quality of food is high in this restaurant	2.345	5.31
The service of this restaurant is good	2.345	5.655
This restaurant has a good ambiance	3.828	5.207

*Table 10: Means of respondents' answers on restaurants for the group who picked restaurant 2*

After participants made their choice, they were asked several questions about how they feel about their decision and what affected their decision. In table 11, the means of the questions can be seen for each decision. Numbers are average scores on a scale from 1-5.

	Participants who picked high rating and negative reviews	Participants who picked low rating and positive reviews
Confidence	4.308	3.621
Appearance of the restaurant	3	2.966
Name of the restaurant	1.692	1.552
Rating score	4.462	3.379
Reviews	2.154	4.69

*Table 11: Means of respondents' answers on attributes that affected their decision grouped by their choice*

In the second set, Restaurant Blanche with low rating and positive review was exposed to the participants first. Total votes for Restaurant Blanche was 35. The second condition was

Restaurant Frais with high rating and negative reviews. Total votes for the second condition was 10 votes. Restaurants were still the same, but only the rating and reviews were flipped. Restaurant Blanche in set 1 had high ratings and negative reviews, meanwhile in set 2, it has low ratings and positive reviews.

Participants who picked restaurant 1 (Restaurant Blanche) with low rating and positive reviews spent on average 23.517 seconds in the first condition (Restaurant Blanche), and 19.257 seconds in the second condition (Restaurant Frais), which had high rating and negative reviews. In table 12, the means for each question can be seen. Numbers are average scores on a scale from 1-7.

	<b>Restaurant 1 (low rating and positive reviews)</b>	Restaurant 2 (high rating and negative reviews)
I have a positive attitude towards this restaurant	5.686	2.371
The quality of this restaurant is high	5.229	3.086
The quality of food is high in this restaurant	5.314	2.6
The service of this restaurant is good	5.371	2.6
This restaurant has a good ambiance	5.943	3.543

*Table 12: Means of respondents' answers on restaurants for the group who picked restaurant 1*

Participants who picked restaurant 2 (Restaurant Frais) with high rating and negative reviews spent on average 19.605 seconds in the first condition (Restaurant Blanche), which had low rating and positive reviews, and 18.581 seconds in the second condition (Restaurant Frais). In table 13, the means for each question can be seen. Numbers are average scores on a scale from 1-7.

	Restaurant 1 (low rating and positive reviews)	<b>Restaurant 2 (high rating and negative reviews)</b>
I have a positive attitude towards this restaurant	3.2	5.70
The quality of this restaurant is high	3.5	5.8
The quality of food is high in this restaurant	3	5.5
The service of this restaurant is good	2.8	5.8
This restaurant has a good ambiance	4.6	6.10

*Table 13: Means of respondents' answers on restaurants for the group who picked restaurant 2*



After participants made their choice, they were asked several questions about how they feel about their decision and what affected their decision. In table 14, the means of the questions can be seen for each decision. Numbers are average scores on a scale from 1-5.

	Participants who picked low rating and positive reviews	Participants who picked high rating and negative reviews
Confidence	3.714	4.4
Appearance of the restaurant	3.371	3.3
Name of the restaurant	1.543	1.8
Rating score	2.914	4.8
Reviews	4.629	2.4

*Table 14: Means of respondents' answers on attributes that affected their decision grouped by their choice*

Same as the first product category, respondents that took the restaurant test also preferred low rating and positive reviews over high rating and negative reviews. Total vote difference was significant. Here, we can also see that participants spent more time on the restaurants with low ratings and positive reviews. Moreover, we see the same pattern here with the confidence rating. People that picked the restaurants with low rating and positive reviews score lower in confidence rating.

### 4.3 Amazon Passed Group

In the first set of the Amazon passed group, a coffee machine with high rating and negative reviews was the first condition. Participants were exposed to Black Decker, with high rating and negative reviews first, which got 20 votes in total. Second condition was Mr. Coffee with low rating and negative reviews, which had 30 votes.

Participants who picked coffee machine 1 (Black Decker), which had high rating and negative reviews spent 30.081 seconds in the first condition (Black Decker), and 23.480 seconds in the second condition (Mr. Coffee), which had low rating and negative reviews.

Respondents also answered a series of questions about their opinion on the restaurants. In table 15, the means for each question can be seen. Numbers are average scores on a scale from 1-7.

	<b>Coffee Machine 1 (high rating and negative reviews)</b>	Coffee Machine 2 (low rating and positive reviews)
I have a positive attitude towards this coffee machine	4.55	3.05
The quality of this coffee machine is high	4.25	3.05
The design and look of this coffee machine is good	4.80	3.7
The technical specifications of this coffee machine is good	4.50	3.2

*Table 15: Means of respondents' answers on coffee machines for the group who picked coffee machine 1*

Participants who picked coffee machine 2 (Mr. Coffee), which had low rating and positive reviews spent 34.160 seconds in the first condition (Black Decker), which had high rating and negative reviews, and 27.859 seconds in the second condition (Mr. Coffee). In table 16, the means for each question can be seen. Numbers are average scores on a scale from 1-7.

	Coffee Machine 1 (high rating and negative reviews)	<b>Coffee Machine 2 (low rating and positive reviews)</b>
I have a positive attitude towards this coffee machine	2.562	5
The quality of this coffee machine is high	2.312	4.562
The design and look of this coffee machine is good	3.688	4.688
The technical specifications of this coffee machine is good	2.625	4.594

*Table 16: Means of respondents' answers on coffee machines for the group who picked coffee machine 2*

After participants made their choice, they were asked several questions about how they feel about their decision and what affected their decision. In table 17, the means of the questions can be seen for each decision. Numbers are average scores on a scale from 1-5.

	Participants who picked high rating and negative reviews	Participants who picked low rating and positive reviews
Confidence	3.6	3.613
Physical appearance of the coffee machine	2.65	3
Brand of the coffee machine	2.3	2.367
Rating score	4.25	2.833
Reviews	2.8	4.433
Technical features of the coffee machine	1.9	3.167

*Table 17: Means of respondents' answers on attributes that affected their decision grouped by their choice*

In the second set, a coffee machine with low rating and positive reviews was the first condition. Participants were exposed to Black Decker, with low rating and positive reviews first, which got 25 votes in total. Second condition was Mr. Coffee with high rating and positive reviews, which had 13 votes. Coffee machines were still the same, but only the rating and reviews were flipped. Black Decker in set 1 had high ratings and negative reviews, meanwhile in set 2, it has low ratings and positive reviews.

Participants who picked coffee machine 1 (Black Decker), which had low rating and positive reviews spent 45.49 seconds in the first condition (Black Decker), and 29.907 seconds in the second condition (Mr. Coffee), which had high rating and negative reviews. In table 18, the means for each question can be seen. Numbers are average scores on a scale from 1-7.

	<b>Coffee Machine 1 (low rating and positive reviews)</b>	Coffee Machine 2 (high rating and negative reviews)
I have a positive attitude towards this coffee machine	5.36	2.36
The quality of this coffee machine is high	4.68	2.8
The design and look of this coffee machine is good	4.44	4.52
The technical specifications of this coffee machine is good	4.4	3.32

*Table 18: Means of respondents' answers on coffee machines for the group who picked coffee machine 1*

Participants who picked coffee machine 2 (Mr. Coffee), which had high rating and negative reviews spent 30.946 seconds in the first condition (Black Decker), which had low rating and positive reviews, and 27.515 seconds in the second condition (Mr. Coffee). In table 19, the means for each question can be seen. Numbers are average scores on a scale from 1-7.

	Coffee Machine 1 (low rating and positive reviews)	<b>Coffee Machine 2 (high rating and negative reviews)</b>
I have a positive attitude towards this coffee machine	3.3692	5
The quality of this coffee machine is high	2.923	5.385
The design and look of this coffee machine is good	3.308	5.231
The technical specifications of this coffee machine is good	3	5

*Table 19: Means of respondents' answers on coffee machines for the group who picked coffee machine 2*

After participants made their choice, they were asked several questions about how they feel about their decision and what affected their decision. In table 20, the means of the questions can be seen for each decision. Numbers are average scores on a scale from 1-5.

	Participants who picked low rating and positive reviews	Participants who picked high rating and negative reviews
Confidence	3.48	4.154
Physical appearance of the coffee machine	2.71	3
Brand of the coffee machine	2.32	2.231
Rating score	3.12	4.385
Reviews	4.4	2.538
Technical features of the coffee machine	2.84	2.682

*Table 20: Means of respondents' answers on attributes that affected their decision grouped by their choice*

Results on the coffee machines were very similar to restaurants and books. Participants here also preferred the coffee machine with low rating and positive reviews with a clear margin. Time spent was also different on those two groups, with low rating and positive reviews group spending more time on the pages. The difference in confidence rating was significantly higher in set 2. People that picked the coffee machine with low rating and positive reviews had lower confidence than the other group. However, in set 1 the confidence rating was almost identical.

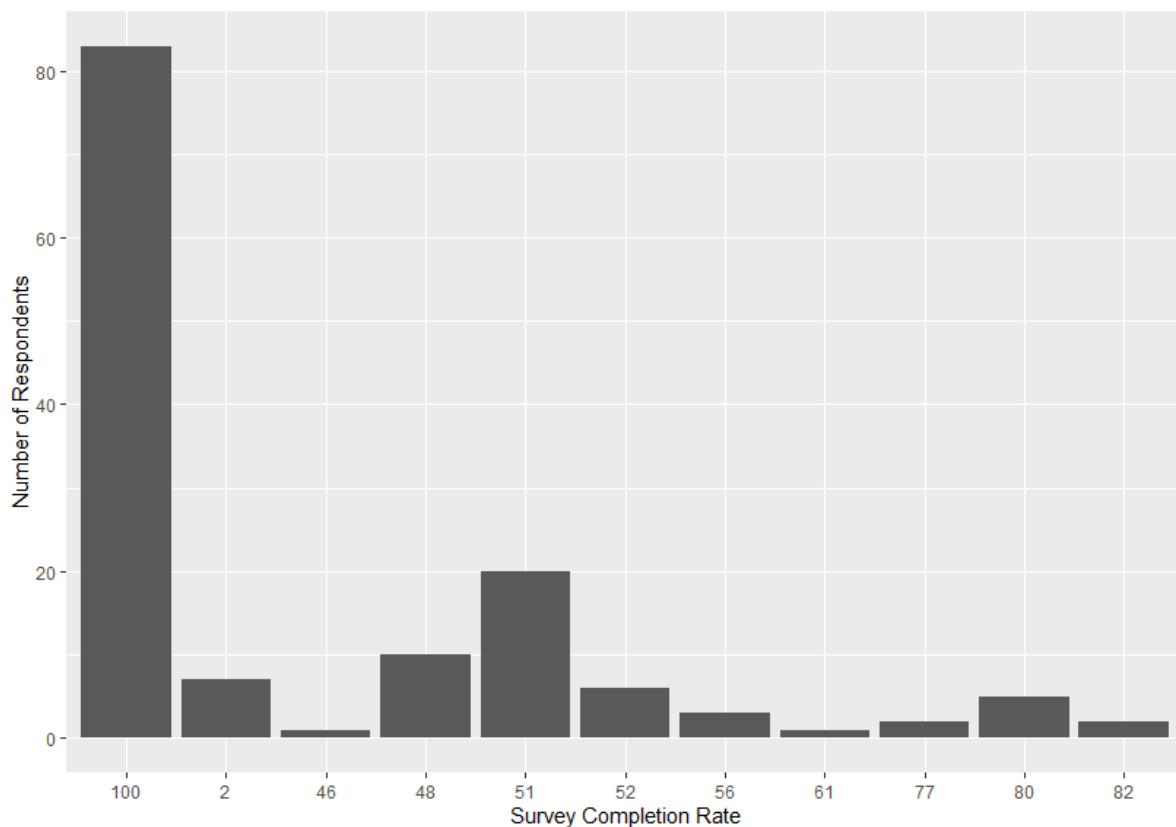
To sum up the findings on this test, in both sets of all three categories, people seemed to prefer low rating & positive reviews over high rating & negative reviews. Participants that preferred low rating & positive reviews spent more time on the pages, but they had lower confidence rating than the other group.

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## 5. Data Analysis

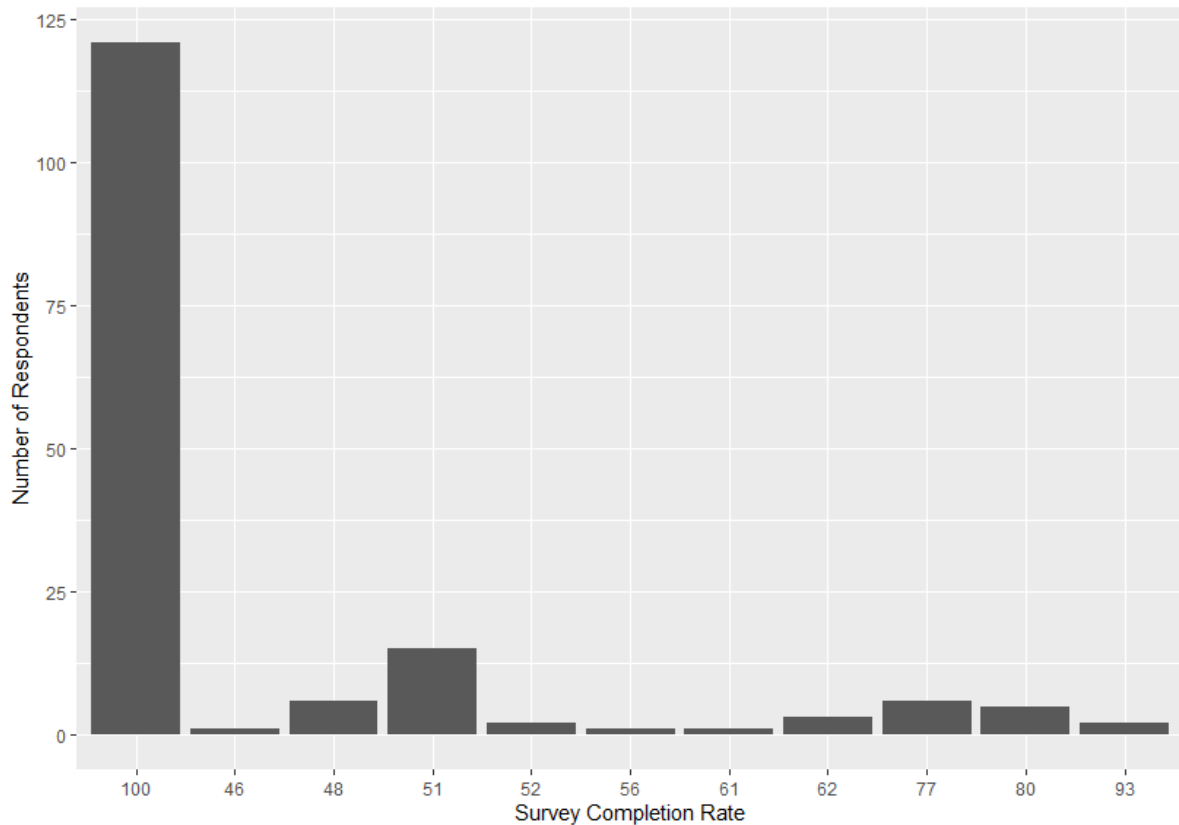
### 5.1 Data Cleaning

Data set has been separated into two groups because of the attention check; participants that failed the attention check and participants that passed. In terms of survey completion rate, it can be seen that the participants that failed the attention check also have a lower percentage of completing the survey than the participants that passed. In order to not compromise the results, people who have not answered all questions in one set have been removed from these sets. Which means that only participants who had a progress rate equal or above to 77% were included in all of the data analysis sets.



*Figure 10: Survey Completion Rate of Respondents who failed the Attention Check Question*





*Figure 11: Survey Completion Rate of Respondents who passed the Attention Check Question*

	100% Completion Rate	Less than 100% Completion Rate
Attention Check Passed Group	121	42
Attention Check Failed Group	83	57

*Table 21: Distribution of the survey completion rates based on attention check pass status*

The difference in the completion percentage between the participants that failed versus passed the attention check is clear. Out of 303 who participated in the study, 163 passed the attention check, and 140 failed the attention check. Among the 140 participants who failed the attention check, only 83 completed the whole study meaning only 59% of the participants that failed the attention check completed the study. While among the 163 participants that passed the attention check, 121 of them completed the study. 74% of the participants that passed the attention check completed the study.

The difference in y-axis between the two graphs is due to more people quitting the study before completing. The spike in 48 and 51 in Figure 10 explains that 10 and 20 participants completed only 48 and 51% respectively. The difference between these two groups are not only the percentage of exiting the study, but also how early they exit the study. Some of the participants that did not pass the attention check only had a 2% study completion rate, which is extremely low.

## 5.2 Assumptions

The obtained survey data is analyzed using a variety of statistical approaches. This includes logistic regression, linear regression, chi-square test, biserial correlation, ANOVA and Pearson's correlation test. This section will provide a brief explanation and discussion of some of the most important assumptions that statistical approaches must fulfill.

### 5.2.1 Independence of observations

For regression models the observations must be independent in the sense that they are not linked to one another or grouped in any way (Dewey, 2012). There is no risk of interdependence among observations, as it is prevented that the people participating in the online experiment are prevented from solving the questionnaire more than once.

### 5.2.2 Random sampling

A sample is random when each data point in your population has an equal probability of being included in the sample (Berk & Freedman, 2010). This means that each individual is selected by chance rather than choice. This assumption is accurate since the link to the online experiment was distributed randomly across mail groups.

### 5.2.3 Normal distribution

This assumption states that the sampling distribution of the mean or the distribution of means across samples is normal (Mordkoff, 2016). There is no need for skewness analysis for the product selection decision made by the participants. Because this value is a categorical value there is no need to assess data normality. However, for attitude toward product pages are continuous variables, which requires performing the skewness method.

Based on this method attitude toward high rating and negative reviews pages have a skewness of 0.5317, and attitude toward low rating and positive review pages have a skewness of -0.2213. Both of these values fall between -1 and 1, therefore they have a normal distribution.

#### 5.2.4 Expected frequency

In contingency table computations, such as the chi-square test, the expected frequency should be greater or lower than a certain number. This value must be greater than 5 to use the chi-square test (Mitchell, 1971). Since this value is a minimum of 23.83 for our data, the chi-square test can be used.

### 5.3 Variables

As mentioned earlier, the main dependent variable in this study was chosen as the participants' choice of products. This variable is used as a binary variable in data analysis, where 1 is used for the products with a high rating and negative reviews, and 0 is used for the products with low rating and positive reviews. Since this variable is categorical, it limits the statistical methods that can be used. Therefore, the participant's attitudes toward the products were also used as a dependent variable. After examining a product during the survey, the participants scored their attitudes towards this product from 1 to 7. Since people who gave a higher score for the product they tend to choose, this variable will also serve as a choice variable in some analyses.

During the data collection, several variables were measured, which may or may not have an influence on dependent variables. In order to test whether these variables have a correlation to the dependent variables, some correlation tests were conducted. These tests are the Point-Biserial correlation test for binary variables and Pearson's correlation test for continuous variables. Since every product had a different question in the survey, these tests were applied to the three different website groups separately. The following Table 22, 23 & 24 contains the test results:

Control Variables	Dependent variable		
	Choice of Book	Attitude toward High Rating and Negative Review Pages	Attitude toward Low Rating and Positive Review Pages
Time Spent in High Rating and Negative Review Page	0.7650	-0.2473	0.1910
Time Spent in Low Rating and Positive Review Page	-0.7168	-0.2767	0.3301
Confidence about the Book Choice	0.2144	0.0776	0.0324
Effect of Book Cover	0	0.06514	-0.0625
Effect of Book Title	0.091	0.0896	-0.0649
Effect of Rating Score	0.5979	0.5559	-0.3997
Effect of Written Reviews	-0.7604	-0.7344	0.7219
Gender	-	0	0
Age	0	0	0

*Table 22: Pearson's correlation test for Goodreads group*

Control Variables	Dependent variable		
	Choice of Coffee Restaurant	Attitude toward High Rating and Negative Review Pages	Attitude toward Low Rating and Positive Review Pages
Time Spent in High Rating and Negative Review Page	0.7586	-0.1257	0.0835
Time Spent in Low Rating and Positive Review Page	-0.7179	-0.2178	0.1948
Confidence about the Book Choice	0.2793	0.2635	-0.0897
Effect of Product Appearance	-0.0215	0.0133	0.1514
Effect of Brand	0.0966	0.2443	-0.1175
Effect of Rating Score	0.5935	0.5416	-0.4675
Effect of Written Reviews	-0.8388	-0.7549	0.6899
Gender	-	0	0
Age	0	0	0

*Table 23: Pearson's correlation test for TripAdvisor group*

Control Variables	Dependent variable		
	Choice of Coffee Machine	Attitude toward High Rating and Negative Review Pages	Attitude toward Low Rating and Positive Review Pages
Time Spent in High Rating and Negative Review Page	0.5908	-0.2117	0.1454
Time Spent in Low Rating and Positive Review Page	-0.631	-0.2517	0.3058
Confidence about the Book Choice	0.0995	0.3461	0.0585
Effect of Product Appearance	-0.0343	0.0031	-0.0177
Effect of Brand	-0.0261	-0.1947	-0.1
Effect of Rating Score	0.5452	0.4331	-0.398
Effect of Written Reviews	-0.6526	-0.512	0.5735
Effect of Technical Features	-0.3117	-0.1722	0.2913
Gender	-	0	0
Age	0	0	0

*Table 24: Pearson's correlation test for Amazon group*

Because there are multiple significant correlations, all analyses will be adjusted for the relevant significant control variables, and the relationships between variables with significant correlations will be detailed in the results section with further analyses.

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## 6. Results

### 6.1 Results for hypotheses

In this section, the results of the previously mentioned data analyzes will be explained in accordance with the hypotheses.

To test hypothesis H1, Pearson's chi-square test was conducted. The hypothesis as follows:

- *H1: Numerical ratings will have an overall more positive effect on product evaluations than written reviews.*

According to the results of the survey, products with a low rating score, positive reviews received 174 votes, while products with a high rating score, negative reviews received 78 votes. This means that respondents prefer products with lower rating score, positive reviews 55.17% more. In order to understand whether there is a statistical difference between these two choices, it was decided to divide all existing data into groups based on three websites used in the study and see if there is a significant difference between these groups. In the Goodreads group, the product with high rating score received 22 votes, while the product with low rating score received 55 votes. In the TripAdvisor group, the product with high rating score received 23 votes, while the product with low rating score 64 votes. And lastly, in the Amazon group, the product with high rating score received 33 votes, while the product with low rating score 55 votes. When the Pearson's chi-square test was applied for these groups and product choice, the p-value was found to be 0.2467. According to this result, there is no significant difference between the groups. Users tend to choose products with low ratings and positive reviews among all groups. Therefore, this hypothesis was rejected. Please see Appendix E for a mosaic plot of choices and Pearson's chi-square test table.

To test hypothesis H2, a logistic regression analysis, a Pearson's correlation test and a linear regression analysis were conducted. The hypothesis reads as follows:

- *H2: The effect postulated in H1 will be moderated by consumers' time spent on the website. The positive effect of numerical ratings (vs. written reviews) on product evaluations will be stronger for those who spend less time on the website.*

For the test of this hypothesis, the product choices of the participants were chosen as the dependent variable and the time spent in high rating and negative review page, time spent in low rating and positive review page as the control variables. A logistic regression model was created between the selected variables for all available data. According to this model, the standard deviation of the time spent on the high page is 0.008 and the p-value is 0.5017, while the standard deviation of the time spent on the low page is 0.0104 and the p-value is 0.00451.

The results indicate that there is a strong relationship between the users' choice of product and the time they spent on low rating and positive review pages. To understand this relationship better and to make predictions using a logistic regression model, the data were split into training and test data at 80% and 20%, respectively. This model predicts the product preference of users with 72,34% accuracy. Also, the McNemar's test p-value of this estimation is 0.0265, which gives a statistically significant result since this value is less than 0.05.

According to these results there is a correlation between the users' time spent on low rating and positive review pages and their choice about the products. Users who have spent less time on pages with low rating and positive reviews have more probability to choose the option with high rating and negative reviews. In order to understand the hypotheses better, we must also investigate if there is a positive relationship with the effect of numerical ratings on users and the time spent in website pages.

Furthermore, the relationship between the attitude towards high rating and negative reviews products and the participants' total time spent on both product pages should be examined. First, for the relationship between the effect of rating scores and the page durations, it is decided to use a Pearson correlation test and linear regression model to make a prediction between the two variables: scoring variable from 1 to 5, in which users determine how much their rating scores affect their decisions, and the total time users spend on website pages. Based on the Pearson correlation test, there is a correlation between these two variables with a p-value of 0.07056 and a correlation of -0.1141 degrees. Although p-values above 0.05 statistically do not recognize a relationship, Jafari and Ansari-Pour (2019) argues that this limit p-value should be adjusted according to the data size. When a linear regression model is created with the same two variables and the importance score that people give to the rating score is estimated according to the time they spend on their web pages, the accuracy rate is



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74.3%. While the p-value was higher than 0.05 in the total data, the reason why the model still has a high accuracy rate is that not only those who chose the high rating/negative review product but also the 50% of the participants who chose the low rating/positive product gave a score higher than 3 to the question of its effect on the ratings. It could be. In order to better understand this effect, only the total data was divided into two according to the preferences of the users and the linear regression model was repeated.

In accordance with this analysis, the p-value is 0.0366 for those who choose the product with a high rating, while it is 0.815 for those who choose a low rating. For the second relationship which is between the attitude towards high rating and negative reviews products and the participants' total time spent on both product pages, again a simple linear regression model was used. According to this model, the p-value for page duration variable is 0.00274, which indicates that people who have spent less time on the website pages had a higher attitude score towards the high rating and negative review pages.

Since people who gave higher score for these pages has a more possibility to choose an option that has a higher rating score, it can also indicate a relationship between the choices and the page duration. Results from the analyses suggest that there is a correlation between the time users have spent on low rating and positive review pages and their choice about the products. Please see Appendix F for all model summaries, confusion matrix for the prediction and Pearson correlation test table.

To test hypothesis H3, a Pearson's correlation test, ANOVA and a linear regression analysis were conducted. The hypothesis reads as follows:

- *H3: Participants whose choices are influenced by numbers will be more confident about their decision.*

First, it was decided to use a multiple linear regression model in order to understand whether there is a relationship between the effect of ratings on users' choices and their confidence in their decision. In this model, the dependent variable was the participants' confidence about their choices, while the independent variables were determined as the impact score they gave for the rating score and the impact score they gave for the written reviews.

When the model is created for all available data, for rating score we see that the p-value is 0.000996 and the standard deviation is 0.06390, while the p-value for written reviews is

0.2832 and the standard deviation is 0.05979. As reported by these results, while there is a very strong statistical relationship between the participants' confidence and the effect of rating score on their choices, the same relationship does not exist between the participants' confidence and the effect of written reviews.

In addition, ANOVA analysis indicates a p-value of 0.00158 for the relationship between confidence and effects of rating score, while a p-value of 0.28326 for effects of written reviews. This result supports the outcome of multiple linear regression model. According to Pearson's correlation test, there is a correlation of 0.1979434 between confidence and rating score. This correlation value is -0.031 for reviews. To better understand the strength of the relationship between rating score and confidence, an estimation was made using a single linear regression model. All data is divided into two as 80% training and 20% testing. The model was able to predict people's confidence level with 78.59% based on the score they gave for the effect of rating score on their choices.

Based on the analyses and results, it has been determined that there is a strong relationship between people's confidence and the importance they attach to the rating score. The same relationship does not exist for reviews. Please see Appendix G for multiple and single linear regression model summaries, ANOVA results and Pearson correlation test table.

## 6.2 Results for Group that Failed Attention Check

An attention check question was asked to control whether the participants had read the survey questions or not. Participants who did not pass this question were not included in the hypothesis testing process. However, this group also consists of 171 votes, so instead of ignoring it, it was decided to analyze separately and compare these results with the main data group.

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For the main analysis group H1 was tested by using Pearson's chi-square test was conducted. The same statistical analysis were used for the failed group for H1. The hypothesis as follows:

- *H1: Numerical ratings will have an overall more positive effect on product evaluations than written reviews.*

For the failed group, 110 votes were given to the low rating and positive review pages, while 71 votes were given to the high ratings, negative review pages. This makes the difference between the two choices 35.45%, which is lower than the main group. When a Pearson's chi square analysis is applied according to the votes given to each website group and the pages in that group, the p-value of this analysis is 0.20. This is a lower p-value than the main group. Although the majority voted for the low rating and positive review pages, we see that the difference between the two votes is less unlike the main group. This may be due to the fact that people focus on numerical elements rather than on elements that require long attention, such as comments since this group didn't pass the attention check. Please see Appendix H for a mosaic plot of choices and Pearson's chi-square test table.

To test hypothesis H2, a logistic regression analysis, a Pearson's correlation test and a linear regression analysis were conducted for the main data group. For failed group it is decided to focus on logistic and linear regression models to test H2. The hypothesis reads as follows:

- *H2: The effect postulated in H1 will be moderated by consumers' time spent on the website. The positive effect of numerical ratings (vs. written reviews) on product evaluations will be stronger for those who spend less time on the website.*

As in the main data analysis group, there is a strong correlation between the time people spend on websites and their choices in the failed group as well. However, in the main group, it was seen that this relationship was stronger with the time spent on pages with low ratings and positive comments, while it is the opposite for the failed group. Here, the relationship between the time spent in high rating pages and the choice of participants has a p-value of 0.00943, while the low rating pages are 0.42033. After the data of the failed group is separated as 80% train and 20% test, the model predicts with 67.74% accuracy. This is slightly lower than the predictive power of the main group.

Again, just like the main group, a very strong relationship was found between the attitude scores that people gave to high rating and negative comments pages and the time they spent on the total website pages. According to the simple linear regression model, the p value of this relationship is 0.000402 and its standard deviation is 0.0044. In short, participants who gave more importance to numerical elements in this group, as in the main group, spent less time on website pages. Please see Appendix H for logistic regression and single linear regression model summaries.

And lastly, to test hypothesis H3, a Pearson's correlation test and ANOVA were conducted. The hypothesis reads as follows:

- *H3: Participants whose choices are influenced by numbers will be more confident about their decision.*

The results of the statistical analysis performed for this hypothesis were much different from the results of the main group. While all analyzes in the main group show a strong positive relationship between the confidence of the individuals and the importance they gave to the rating score, the results for this group are different.

Based on the ANOVA analysis, the p-value of the relationship between the confidence and importance given to the rating score is 0.018, and the correlation degree is 0.1753. Since this value is less than 0.05, it still indicates a statistically significant relationship. However, the relationship between the confidence and the importance given to the review score has a p-value of 0.000954. It indicates that there is a very strong relationship between these two variables. This was not observed in the main group. When the correlation aspect of this relationship has a value of 0.2820 in the positive direction. In summary for the failed group, participants who give more importance to the review score are a little more confident than those who give more importance to the rating score. Please see Appendix H5, H6 and H7 for linear regression summary and ANOVA results.

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## 7. General Discussion & Conclusion

### 7.1 Main insights

The goal of this master's thesis was to analyze the effect of numerical values and words on the consumer decision process. In order to understand this relationship, we analyzed the people's preference on numeral ratings and written reviews and how these two elements in a website affect people's behavior. Further, we aimed to explore the rating score and written review information available at websites and their relationship with consumer's confidence about their choices and the time they spent investigating a website page to make a decision.

One of the main points of our research suggests that numerical ratings will have an overall more positive effect on product evaluations than written reviews, therefore people will tend to choose products that have a high rating score and negative reviews over low rating score and positive reviews. In the online experiment that was conducted the products with a low rating score and positive reviews received 174 votes, while products with a high rating score and negative reviews received 78 votes. This suggests that participants had 55.17% more tendencies to pick products with low rating but positive reviews. Since 3 different websites and 3 different product types were used in the online experiment, and the character length of the written reviews on each website was different, these products choices were compared for all 3 groups. In this comparison, the p-value is higher than 0.05, which indicates that this is valid for each group and that peoples are more inclined to products with positive comments.

During our data analysis, a strong correlation between consumers' attitude towards high rating, negative reviews products and the time they spent on website pages was discovered. There is a reason to believe that the correlation between those two variables is not coincidental. Based on the principles of ELM, people that are highly motivated will involve more in the test and therefore be more interested in paying more attention, reading through the reviews, which of course result in spending more time. Hoyer, MacInnis and Pieters (2016) explain in their book that simple messages are more effective for people in low involvement mode, since consumers do not have to process a lot of information. Processing a simple number rating versus reading through different reviews requires less energy and thinking, and we believe that this could have been one of the main factors for the correlation between participants spending less time and choosing high rating versus positive reviews.

Another interesting point is the participants that preferred products with high rating and negative reviews had a higher level of confidence than the participants who preferred products with low rating and positive reviews. A probable explanation for the difference in confidence level could be that participants that chose high rating and negative reviews could have used the high rating score as heuristics and relied blindly on the high rating. Hence the respondents could have missed out on crucial information from the written reviews, leading to their high level of confidence in their choice. Several statistical methods had proved that the relationship between the confidence level and effect of ratings has a p-value lower than 0.05, which indicates a very strong statistical relationship among these two variables.

From a heuristic perspective, information that is more accessible and visible has a more powerful impact on judgment and decision making (Hsee, 1996). In our study, we could somehow argue that numerical ratings are more accessible and visible than the written reviews. On the Goodreads set, the numerical ratings are placed right next to the book cover, under the book title. On the Amazon and Tripadvisor sets, the numerical ratings are placed twice, right above and underneath the product picture. Furthermore, the number rating indicator, whether it be dots or stars, are in completely different colors (yellow and green) which make them more visibly noticeable.

If we consider the three product categories as high involvement decisions, central route persuasion is adopted, and the participants would spend more time deciding based on the available information. However, it is not easy to judge whether these products are high involvement for the participants. It will be different for each individual. People with low interest, knowledge or motivation in coffee machines are more likely to spend less time on reading through the reviews and pay attention to the details by the principles of ELM and system 1 and system 2 thinking (Kahneman, 2011; Petty & Cacioppo, 1986).

To minimize the effect of bias or emotional preference, any indicators that could trigger bias effect or emotional preference were excluded. Hence neither country indicator nor specific cuisines on restaurants. The addresses of the restaurants are written in a small print under the restaurant name, but both in relatively small cities of Portugal. With coffee machines, well-known brands were excluded to avoid the effect of any strong attitudes

towards the specific brand, and the names of the books and authors of the books were made up. Written reviews are generated by us, and therefore not affected by any bias.

## 7.2 Limitations

Several methodological limitations should be considered when interpreting the results of this study. As already mentioned in the literature review, the study encouraged participants to focus and pay close attention. We believe that this could have been a factor to motivate people into more high involvement in the study than in normal circumstances. In other words, participants were forced to focus and pay more attention to the different products and reviews than they would do in a real situation. This could have enhanced the effect of the reviews in an unnatural way, and we could have gotten an exaggerated impact on the reviews.

High involvement participants would spend more time processing and assessing the information from the study, meaning they are more likely to read through the reviews, look at the products' appearances etc. The perfect example of high involvement participants in our study would be the respondents who chose "Last Summer" in Goodreads set 2, which had low rating and positive reviews. They spent on average 106 seconds on this exact page. If the participants were not urged and encouraged to pay close attention, it is not certain that we would be observing a result like this.

The created web pages were designed to be as similar as the real web pages, however not all functions were included. There was no possibility of browsing back a page, meaning that if participants forgot details of the products, they would have to choose without being 100% sure of their answers. Review volume has proven to have a significant effect on consumer behavior and purchasing decisions (Purnawirawan et al., 2015). However, it is only present in TripAdvisor sets. The results could have been different if the review volume was displayed in all three product categories.

The volume of reviews can be an indicator for how popular a product is and is considered as an objective and precise measure (Fileri et al., 2021). Review helpfulness has a similar purpose. The volume of ratings and reviews are found to be related to perceived credibility

(Lim & Van Der Heide, 2015; Xie, Zhang & Zhang, 2014). Adding volume next to Goodreads and Amazon sets and helpfulness ratings, such as likes, or a thumbs up function next to the reviews could have affected the source credibility in a positive way. Moreover, adding volume and helpfulness ratings could have affected the low involvement participants more since source credibility is an important peripheral cue (Mak et al., 1997).

The combination of encouraging participants to pay close attention and screening participants that did not pass the attention check could have led to unusually bigger proportion of high involvement participants in our study and therefore a more unbalanced distribution of high and low involvement respondents in our test.

Study from Forman, Ghose and Wiesenfeld (2008) found that moderate ratings, around 3.0, were perceived as less helpful compared to extreme ratings, 1.0 or 5.0. Another study from Pavlou and Dimoka (2006) also proved that extremely positive or negative ratings of online sellers were perceived as more helpful than moderate ratings. This could mean that more people might have chosen the high rating and negative reviews if the ratings were 5.0 instead of 4.5, while fewer people might have chosen the low rating and positive reviews since the rating would have been 1.0 instead of 3.0

Even though we tried to prevent order effects by randomizing the order of the treatments which participants were exposed to, there was still an order of which conditions were exposed. Hence, participants have some sort of reference or comparison point when exposed to the second condition. This was simply impossible to prevent in our within-subject design since we could not un-ask the question or un-show the treatments that the subjects were exposed to (Charness et al., 2012).



## 7.3 Conclusion

The main question in our thesis when comparing the written reviews and the rating scores, is if numerical elements impact consumers' decisions more than words. In the online experiment that was conducted, it was found that participants chose products with low ratings and positive reviews significantly more, while there were clear differences between participants who preferred products with low ratings and positive reviews versus those who preferred products with high ratings and negative reviews. One of these differences is the time that participants spent on website pages. The group that chose products with a high rating and negative reviews spent less time on website pages, which can indicate that participants who are motivated by numbers had a lower attention span and spent less time on investing in the product pages. Simple statements are more successful for individuals in low involvement states, according to Hoyer, MacInnis, and Pieters (2016). Therefore, in this thesis, it is believed that one of the primary causes for the correlation between participants spending less time and picking products with high ratings rather than positive reviews is that processing a simple number rating versus going through many written reviews needs less energy and concentration.

According to the statistical analysis, there is also a strong positive correlation between the participant's confidence in their decision and their product choice for participants who chose the products with high ratings and negative comments. Participants who give more importance to numerical elements and make their choices according to this have a higher level of confidence. One of the reasons for this strong relationship could be that the respondents may have interpreted the high rating score as heuristics and have ignored important information from the written reviews, resulting in their high level of confidence in their decision.

There are also some limitations to this study that need to be addressed. Encouraging people to pay close attention and read carefully could have changed participants' behavior before taking the study. Furthermore, the study was not designed to browse back and forth, making it impossible for participants to view the product and service pages again. Another limitation is that participants have some sort of reference or comparison point when exposed to the second product after viewing the first product. We couldn't un-ask the question or un-show

the products that the subjects were exposed to, therefore this was impossible to avoid in our within-subject design (Charness et al., 2012).

One of the limitations of this study and the point where it can be improved is that the generated web pages were made to resemble genuine websites as closely as possible, although not all functionalities were provided. In this study, participants can see an entire web page directly. They do not need to scroll down to see comments on selected websites. This allows them to focus on both the rating score and the written comments at the same time. It is important to mimic the functions of a website in such a study for future research. For example, on Amazon pages, users first see the product image and rating score and then scroll down to reach the comments. In such a case, the user will not be exposed to all elements at the same time, so his perception will change.

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## Appendix

### Appendix A: Survey Distribution & Questions

#### Appendix A1: E-Mail

## Invitation to participate in the survey about consumer behavior toward different products and services



**Sigurd Lim**, Bengisu Ülker  
NHH Announcements

April 28, 2022 at 9:54am



Hi!

Bengisu Ülker and I are studying consumer behavior toward different products and services for our Master's Thesis and therefore have made a short survey that takes approximately 10 minutes to complete. All responses are completely anonymous. We depend on as many participants as possible and we really appreciate you participating.

[https://nhh.eu.qualtrics.com/jfe/form/SV\\_cSb7a8BLQRymgzs](https://nhh.eu.qualtrics.com/jfe/form/SV_cSb7a8BLQRymgzs)

Thanks in advance!

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## Appendix A2: Survey Questions

NHH



### Welcome!

We are studying consumer behavior toward different products and services for our Master's Thesis at the Norwegian School of Economics (NHH). Answering this survey will take approximately 10 minutes.

In this study, you will be presented with 2 different products for 2 different website pages, and then be asked about your opinions on these products. There are no wrong or right answers. So, please answer as frankly as possible.

All information you provide will be treated confidentially and kept **completely anonymous**. Your name will not appear anywhere. And your answers will not be linked to your name in any way.

While answering, please do not refresh pages or open multiple tabs with this URL. Also, you will be not be able to navigate back once you have proceeded to the next page.

IF you agree that you

- have read this text
- do not have any questions regarding participation
- are at least 18 years of age
- wish to participate in this study,

please select 'I AGREE' and click the proceed arrow to start the study.

I AGREE

NHH



This text is about the following issue. In surveys sometimes participants do not carefully read the instructions and just select randomly in order to finish the survey. This leads to several random responses that can compromise the results.

To confirm that you read our instructions carefully, please choose BOTH "Orange Juice" and "Tea" as your answers to the question below.

---

What's your favorite drink?

Orange Juice

Coffee

Tea

Hot Chocolate



---

## Questions for Goodreads Group

NHH



In the next part, you will be presented 2 different books from Good Reads and then we will ask you which book you would choose. Please take your time to make your decision and look carefully at the presentation, ratings and reviews of the books.



NHH



On a scale from 1 = "I do not agree at all" to 7 = "I strongly agree", to what extent do you agree on the following statements?

	1	2	3	4	5	6	7
I have a positive attitude towards this book	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The content quality of this book is high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The author of this book is a good writer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



NHH



In this part you will be answering questions about the books you've viewed.

---

Which book would you prefer to read?

Book 1

Book 2



NHH



On a scale from 1 to 5, how confident are you that you have chosen the best book?

	1	2	3	4	5
Confidence rating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



NHH



Using a scale of 1 = "It did not affect my choice at all" to 5 = "It affected my choice the most", please rate the following aspects that have affected your decision for the book you've picked earlier

	1	2	3	4	5
Cover of the book	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Title of the book	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rating score	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Written reviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## Questions for TripAdvisor Group

NHH



In the next part, you will be presented 2 different restaurants from Trip Advisor website and then we will ask you which restaurant you would prefer to go. Please take your time to make your decision and look carefully at the presentation, ratings and reviews of the restaurants.



NHH



On a scale from 1 = "I do not agree at all" to 7 = "I strongly agree", to what extent do you agree on the following statements?

	1	2	3	4	5	6	7
I have a positive attitude towards this restaurant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The quality of this restaurant is high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The quality of food is high in this restaurant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The service of this restaurant is good	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This restaurant has a good ambiance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

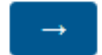


NHH



On a scale from 1 to 5, how confident are you that you have chosen the best restaurant?

	1	2	3	4	5
Confidence rating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



NHH

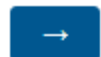


In this part you will be answering questions about the restaurants you've viewed.

Which of the two restaurants would you prefer to go to?

Restaurant 1

Restaurant 2



NHH



Using a scale of 1 = "It did not affect my choice at all" to 5 = "It affected my choice the most", please rate the following aspects that have affected your decision for the restaurant you've picked earlier?

	1	2	3	4	5
Appearance of the restaurant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Name of the restaurant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rating score	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Written reviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



---

## Questions for Amazon Group

NHH



In the next part, you will be presented 2 different coffee machines from Amazon and then we will ask you which machine you would choose. Please take your time to make your decision and look carefully at the presentation, ratings and reviews of the coffee machines.



NHH



On a scale from 1 = "I do not agree at all" to 7 = "I strongly agree", to what extent do you agree on the following statements?

	1	2	3	4	5	6	7
I have a positive attitude towards this coffee machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The quality of this coffee machine is high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The design and look of this coffee machine is good	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The technical specifications of this coffee machine is good	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



NHH



In this part you will be answering questions about the coffee machines you've viewed.

---

Which coffee machine would you prefer to buy?

Coffee Machine 1

Coffee Machine 2



NHH



On a scale from 1 to 5, how confident are you that you have chosen the best coffee machine?

	1	2	3	4	5
Confidence rating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>





NHH



Using a scale of 1 = "It did not affect my choice at all" to 5 = "It affected my choice the most", please rate the following aspects that have affected your decision for the coffee machine you've picked earlier

	1	2	3	4	5
Physical appearance of the coffee machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brand of the coffee machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rating score	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Written reviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technical features of the coffee machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## Demographic questions

NHH



Thank you for your time taking this survey, in this last part we would like you to answer some questions which will help us to understand the demographics of this study.

---

What gender do you identify as?

Male

Female

Non-binary / third gender

Prefer not to say

---

---

What age are you?

18 - 24

25 - 34

35 - 44

45 - 54

55 - 64

65 or older

---

What is the highest degree or level of education you have completed?

Less than high school

High school graduate

Bachelor's Degree

Master's Degree

Ph.D. or higher

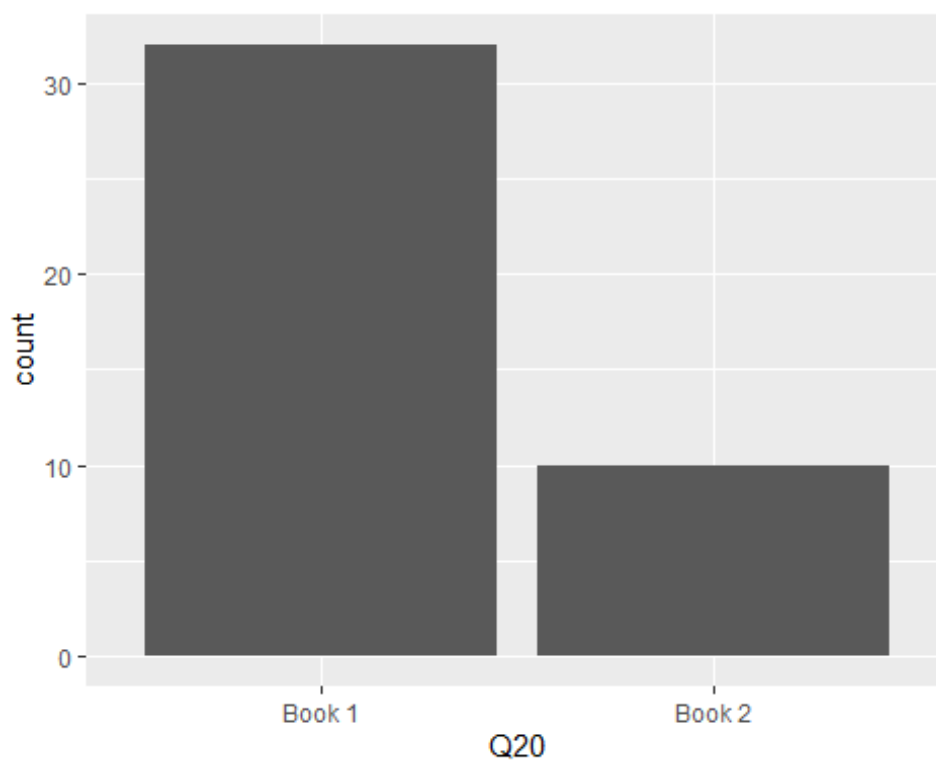
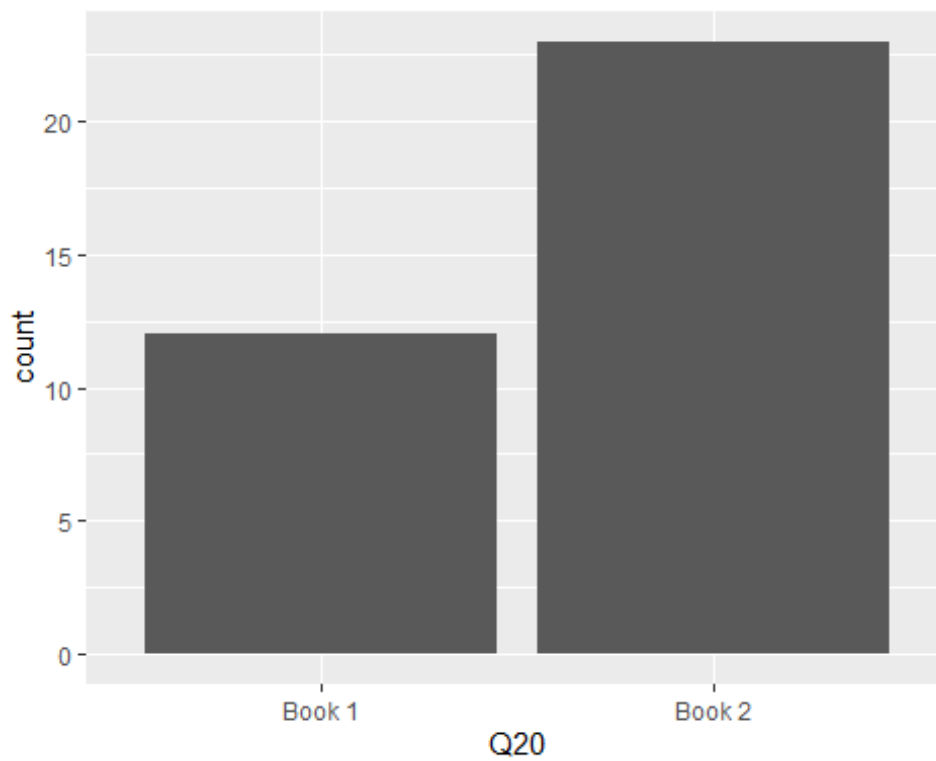
Other

Prefer not to say

---

## Appendix B: Statistical Analysis of Survey Answers

Statistics such as mean, median and plots for the attribute questions for Goodreads.



```
## Progress          Duration..in.seconds.  Finished
attention_check
## Length:12        Length:12                Length:12      Length:12
```

```

## Class :character   Class :character   Class :character
Class :character
## Mode :character   Mode :character   Mode :character
Mode :character
##
##
##
## Q58_First.Click   Q58_Last.Click   Q58_Page.Submit   Q58_Click.Count
## Min. : 0.000     Min. : 0.00       Min. :10.54       Min. : 0.000
## 1st Qu.: 0.000   1st Qu.: 0.00     1st Qu.:23.29     1st Qu.: 0.000
## Median : 0.000   Median : 0.00     Median :40.26     Median : 0.000
## Mean : 3.904     Mean :10.33       Mean :38.26       Mean : 3.083
## 3rd Qu.: 6.741   3rd Qu.:16.86    3rd Qu.:50.43    3rd Qu.: 3.750
## Max. :18.040    Max. :48.80       Max. :71.73       Max. :15.000
## Q13_1            Q13_2            Q13_3            Q60_First.Click
## Min. :4.000     Min. :4.00        Min. :4.000       Min. : 0.000
## 1st Qu.:5.000   1st Qu.:5.00     1st Qu.:5.750    1st Qu.: 0.000
## Median :6.000   Median :6.00     Median :6.500     Median : 0.000
## Mean :5.583     Mean :5.75        Mean :6.083       Mean : 2.114
## 3rd Qu.:6.000   3rd Qu.:6.25     3rd Qu.:7.000    3rd Qu.: 2.469
## Max. :7.000     Max. :7.00        Max. :7.000       Max. :14.216
## Q60_Last.Click   Q60_Page.Submit   Q60_Click.Count   Q15_1
## Min. : 0.000     Min. : 5.45       Min. : 0.000       Min. :2.000
## 1st Qu.: 0.000   1st Qu.:11.10    1st Qu.: 0.000    1st Qu.:2.000
## Median : 0.000   Median :18.22     Median : 0.000     Median :3.000
## Mean : 7.596     Mean :21.04       Mean : 2.583       Mean :2.833
## 3rd Qu.: 7.190   3rd Qu.:32.64    3rd Qu.: 2.250    3rd Qu.:3.000
## Max. :36.933    Max. :43.78       Max. :18.000       Max. :4.000
## Q15_2            Q15_3            Q20              Q21_1
## Min. :2.000     Min. :2.000       Length:12          Min. :3.000
## 1st Qu.:2.750   1st Qu.:2.000    Class :character   1st Qu.:3.750
## Median :3.000   Median :3.000     Mode :character    Median :5.000
## Mean :3.167     Mean :2.917       Mean :4.333       Mean :4.333
## 3rd Qu.:4.000   3rd Qu.:3.250    3rd Qu.:5.000     3rd Qu.:5.000
## Max. :5.000     Max. :5.000       Max. :5.000       Max. :5.000
## Q23_1            Q23_2            Q23_3            Q23_4            Q63
## Min. :1.0       Min. :1.00        Min. :3.0          Min. :1.0        Length:12
## 1st Qu.:1.0     1st Qu.:1.00     1st Qu.:4.0       1st Qu.:2.0
Class :character
## Median :1.0     Median :2.00      Median :5.0        Median :2.5
Mode :character
## Mean :1.5       Mean :2.25        Mean :4.5          Mean :2.5
## 3rd Qu.:2.0     3rd Qu.:3.25     3rd Qu.:5.0       3rd Qu.:3.0
## Max. :3.0       Max. :5.00        Max. :5.0          Max. :4.0
## Q64              Q65
## Length:12        Length:12
## Class :character  Class :character
## Mode :character  Mode :character
##
##
##
## Progress          Duration..in.seconds.  Finished
attention_check

```

```

## Length:23          Length:23          Length:23          Length:23
## Class :character  Class :character  Class :character
Class :character
## Mode :character   Mode :character   Mode :character
Mode :character
##
##
##
## Q58_First.Click   Q58_Last.Click   Q58_Page.Submit   Q58_Click.Count
## Min. : 0.000     Min. : 0.00       Min. : 1.542      Min. : 0.000
## 1st Qu.: 0.000   1st Qu.: 0.00     1st Qu.: 34.512   1st Qu.: 0.000
## Median : 0.000   Median : 0.00     Median : 48.011   Median : 0.000
## Mean : 3.635     Mean : 16.44      Mean : 69.223     Mean : 3.565
## 3rd Qu.: 2.978   3rd Qu.: 23.29    3rd Qu.: 65.944   3rd Qu.: 4.000
## Max. :45.143     Max. :105.59      Max. :463.025     Max. :17.000
## Q13_1            Q13_2            Q13_3            Q60_First.Click
## Min. :1.000     Min. :1.000      Min. :1.000      Min. : 0.000
## 1st Qu.:1.000   1st Qu.:1.000    1st Qu.:1.500    1st Qu.: 0.000
## Median :2.000   Median :3.000     Median :2.000     Median : 0.000
## Mean :2.348     Mean :2.478      Mean :2.739      Mean : 2.379
## 3rd Qu.:3.000   3rd Qu.:3.000    3rd Qu.:4.000    3rd Qu.: 2.031
## Max. :5.000     Max. :7.000      Max. :6.000      Max. :20.037
## Q60_Last.Click   Q60_Page.Submit   Q60_Click.Count   Q15_1
## Min. : 0.00      Min. : 2.378     Min. : 0.000     Min. :3.000
## 1st Qu.: 0.00    1st Qu.: 21.314  1st Qu.: 0.000   1st Qu.:4.000
## Median : 0.00    Median : 30.432  Median : 0.000   Median :5.000
## Mean : 13.42     Mean : 38.812   Mean : 3.087     Mean :5.174
## 3rd Qu.: 15.45   3rd Qu.: 49.180  3rd Qu.: 2.500   3rd Qu.:6.000
## Max. :111.99     Max. :115.538   Max. :22.000     Max. :7.000
## Q15_2            Q15_3            Q20              Q21_1
## Min. :3.000     Min. :3.000     Length:23        Min. :1.000
## 1st Qu.:4.000   1st Qu.:4.000   Class :character  1st Qu.:3.000
## Median :6.000   Median :6.000   Mode :character   Median :4.000
## Mean :5.304     Mean :5.348     Mean :            Mean :3.783
## 3rd Qu.:6.000   3rd Qu.:6.000   3rd Qu.:         3rd Qu.:4.500
## Max. :7.000     Max. :7.000     Max. :            Max. :5.000
## Q23_1            Q23_2            Q23_3            Q23_4
## Min. :1.000     Min. :1.000     Min. :1.000     Min. :3.000
## 1st Qu.:1.000   1st Qu.:2.000   1st Qu.:2.000   1st Qu.:5.000
## Median :2.000   Median :2.000   Median :3.000   Median :5.000
## Mean :2.217     Mean :2.261     Mean :2.913     Mean :4.696
## 3rd Qu.:3.000   3rd Qu.:3.000   3rd Qu.:4.000   3rd Qu.:5.000
## Max. :5.000     Max. :4.000     Max. :5.000     Max. :5.000
## Q63              Q64              Q65
## Length:23        Length:23        Length:23
## Class :character  Class :character  Class :character
## Mode :character   Mode :character   Mode :character
##
##
##
## Progress          Duration..in.seconds.  Finished
attention_check
## Length:32        Length:32        Length:32        Length:32

```

```

## Class :character      Class :character      Class :character
Class :character
## Mode :character      Mode :character      Mode :character
Mode :character
##
##
##
## Q61_First.Click      Q61_Last.Click      Q61_Page.Submit      Q61_Click.Count
## Min. : 0.000        Min. : 0.00         Min. : 20.54         Min. : 0.000
## 1st Qu.: 0.000      1st Qu.: 0.00       1st Qu.: 44.53      1st Qu.: 0.000
## Median : 0.000      Median : 0.00       Median : 59.25      Median : 0.000
## Mean : 27.122       Mean : 48.04       Mean :105.61       Mean : 4.688
## 3rd Qu.: 2.593     3rd Qu.: 33.22     3rd Qu.: 98.66     3rd Qu.: 2.250
## Max. :740.096     Max. :823.07     Max. :824.07     Max. :51.000
## Q17_1              Q17_2              Q17_3              Q62_First.Click
## Min. :2.000        Min. :2.000        Min. :2.000        Min. : 0.0000
## 1st Qu.:5.000     1st Qu.:4.000     1st Qu.:4.000     1st Qu.: 0.0000
## Median :5.000     Median :5.000     Median :5.000     Median : 0.0000
## Mean :5.469       Mean :4.906       Mean :4.938       Mean : 6.9611
## 3rd Qu.:6.000     3rd Qu.:6.000     3rd Qu.:6.000     3rd Qu.: 0.2925
## Max. :7.000       Max. :7.000       Max. :7.000       Max. :143.4870
## Q62_Last.Click     Q62_Page.Submit     Q62_Click.Count     Q19_1
## Min. : 0.00        Min. : 6.637       Min. : 0.000       Min. :1.000
## 1st Qu.: 0.00      1st Qu.: 22.418     1st Qu.: 0.000     1st Qu.:2.000
## Median : 0.00      Median : 37.261     Median : 0.000     Median :3.000
## Mean : 10.17       Mean : 46.366     Mean : 2.031       Mean :2.719
## 3rd Qu.: 1.70     3rd Qu.: 56.600     3rd Qu.: 0.250     3rd Qu.:3.000
## Max. :154.52     Max. :157.302     Max. :35.000     Max. :5.000
## Q19_2              Q19_3              Q20                Q21_1
## Min. :1.000        Min. :1.000        Length:32          Min. :1.000
## 1st Qu.:2.000     1st Qu.:2.000     Class :character   1st Qu.:3.000
## Median :2.500     Median :3.000     Mode :character    Median :3.500
## Mean :2.719       Mean :2.938          Mean :3.469
## 3rd Qu.:4.000     3rd Qu.:4.000          3rd Qu.:4.000
## Max. :6.000       Max. :6.000          Max. :5.000
## Q23_1              Q23_2              Q23_3              Q23_4
## Min. :1.000        Min. :1.000        Min. :1.000        Min. :1.000
## 1st Qu.:1.000     1st Qu.:1.000     1st Qu.:2.000     1st Qu.:4.000
## Median :1.000     Median :2.000     Median :3.000     Median :5.000
## Mean :1.688       Mean :1.844       Mean :2.969       Mean :4.469
## 3rd Qu.:2.000     3rd Qu.:2.250     3rd Qu.:4.000     3rd Qu.:5.000
## Max. :4.000       Max. :4.000       Max. :5.000       Max. :5.000
## Q63                Q64                Q65
## Length:32          Length:32          Length:32
## Class :character   Class :character   Class :character
## Mode :character    Mode :character    Mode :character
##
##
##
## Progress          Duration..in.seconds.  Finished
attention_check
## Length:10          Length:10          Length:10          Length:10
## Class :character   Class :character    Class :character

```

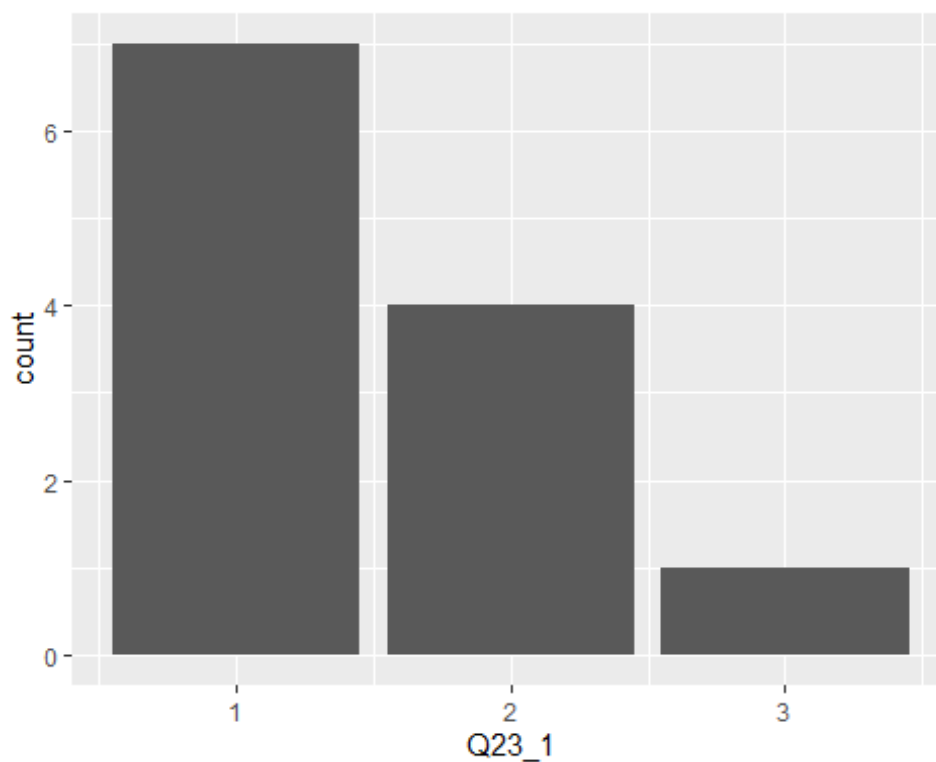
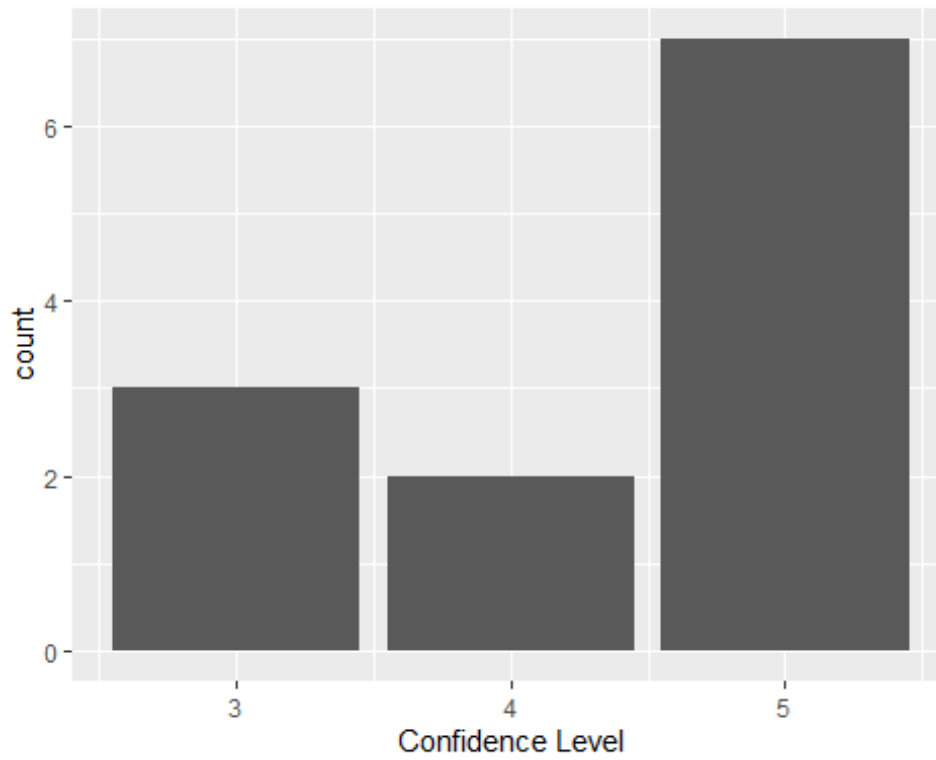
```

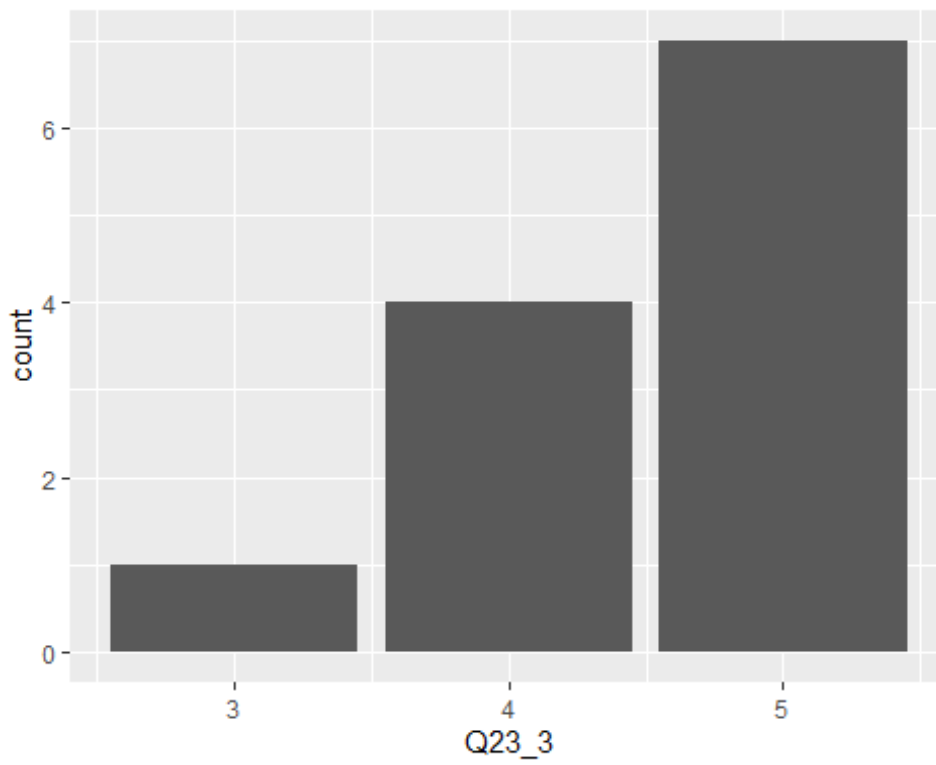
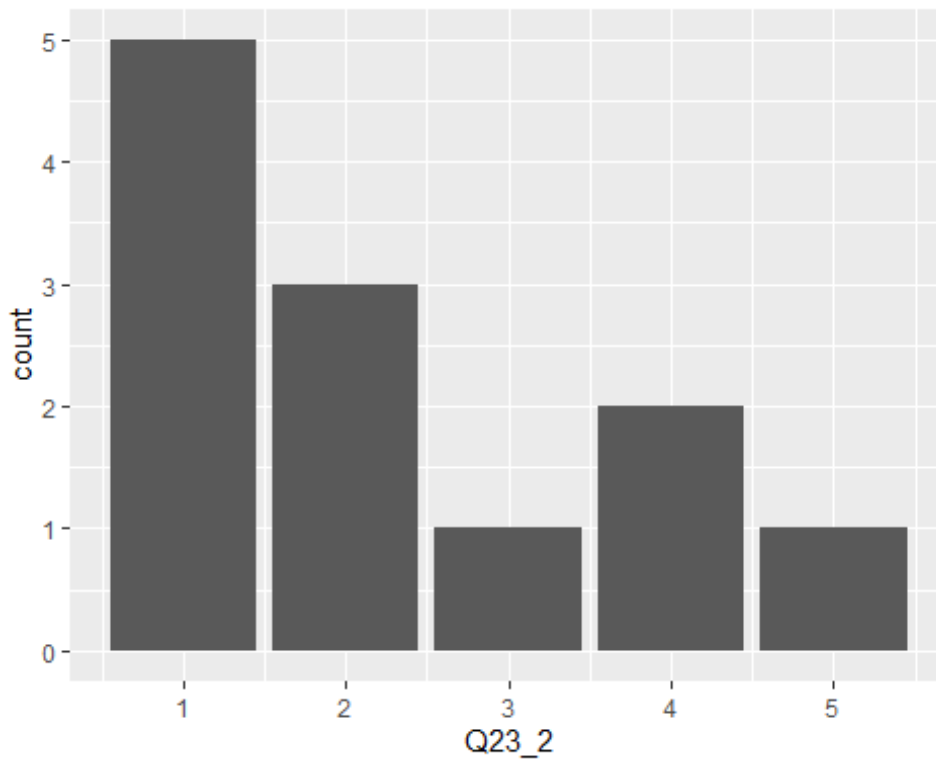
Class :character
## Mode :character   Mode :character   Mode :character
Mode :character
##
##
##
## Q61_First.Click  Q61_Last.Click  Q61_Page.Submit  Q61_Click.Count
## Min. : 0.000    Min. : 0.000    Min. : 6.95     Min. : 0.00
## 1st Qu.: 0.000    1st Qu.: 0.000    1st Qu.:12.91    1st Qu.:0.00
## Median : 0.000    Median : 0.000    Median :15.02    Median :0.00
## Mean : 4.713     Mean : 7.274     Mean :18.06     Mean :1.00
## 3rd Qu.: 9.737    3rd Qu.:10.524    3rd Qu.:19.64    3rd Qu.:0.75
## Max. :20.116     Max. :38.596     Max. :40.12     Max. :8.00
##      Q17_1      Q17_2      Q17_3      Q62_First.Click
Q62_Last.Click
## Min. :2.00    Min. :1.0    Min. :2.0    Min. :0.0000    Min. :
0.000
## 1st Qu.:2.00    1st Qu.:2.0    1st Qu.:2.0    1st Qu.:0.0000    1st Qu.:
0.000
## Median :3.00    Median :3.0    Median :3.0    Median :0.0000    Median :
0.000
## Mean :3.00    Mean :2.8    Mean :3.1    Mean :0.3729    Mean :
1.556
## 3rd Qu.:3.75    3rd Qu.:4.0    3rd Qu.:4.0    3rd Qu.:0.0000    3rd Qu.:
0.000
## Max. :5.00    Max. :4.0    Max. :5.0    Max. :3.7290
Max. :15.560
## Q62_Page.Submit  Q62_Click.Count  Q19_1  Q19_2
Q19_3
## Min. : 2.429    Min. :0.0    Min. :3.00    Min. :4.00
Min. :3.00
## 1st Qu.: 3.787    1st Qu.:0.0    1st Qu.:5.00    1st Qu.:4.25    1st
Qu.:4.25
## Median :12.156    Median :0.0    Median :5.50    Median :5.50
Median :5.50
## Mean :13.089    Mean :0.2    Mean :5.50    Mean :5.20
Mean :5.30
## 3rd Qu.:17.235    3rd Qu.:0.0    3rd Qu.:6.75    3rd Qu.:6.00    3rd
Qu.:6.00
## Max. :36.828    Max. :2.0    Max. :7.00    Max. :6.00
Max. :7.00
##      Q20      Q21_1      Q23_1      Q23_2
Q23_3
## Length:10      Min. :2.00    Min. :1.0    Min. :1.0
Min. :4.0
## Class :character  1st Qu.:2.25    1st Qu.:2.0    1st Qu.:1.0    1st
Qu.:4.0
## Mode :character  Median :5.00    Median :2.0    Median :2.0
Median :5.0
##      Mean :3.90    Mean :2.4    Mean :2.2
Mean :4.6
##      3rd Qu.:5.00    3rd Qu.:3.0    3rd Qu.:3.0    3rd
Qu.:5.0
##      Max. :5.00    Max. :4.0    Max. :4.0

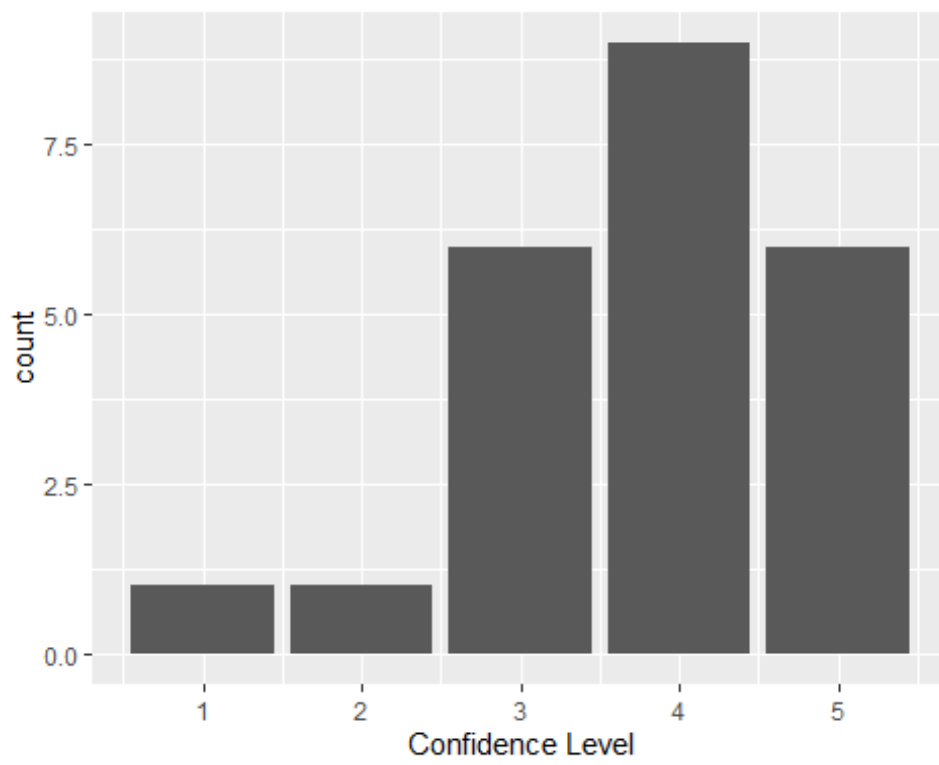
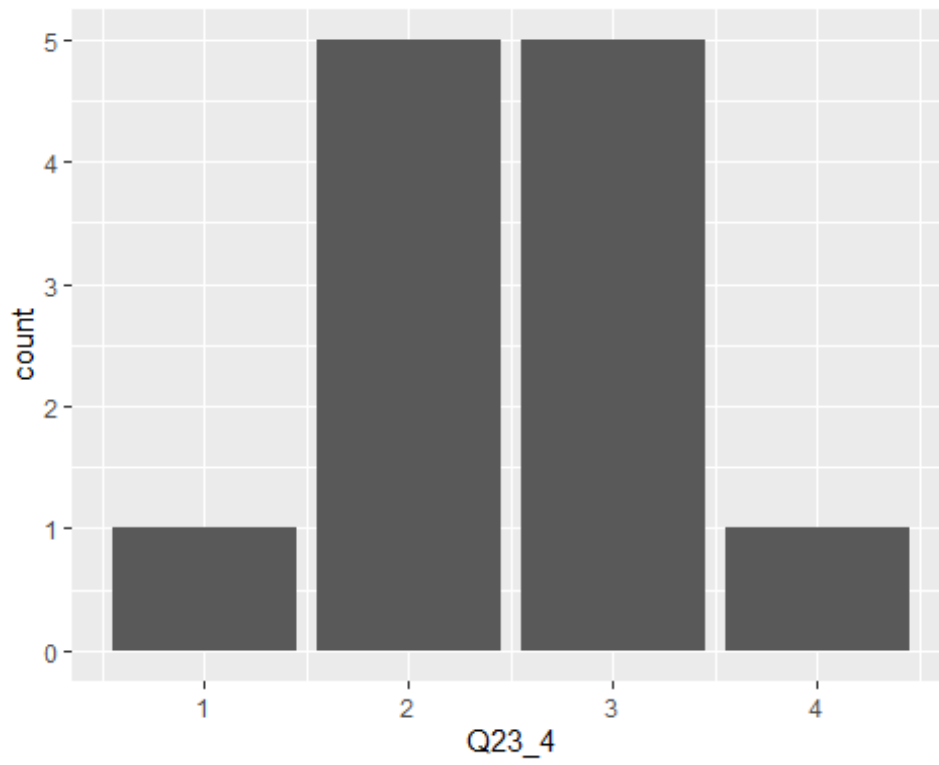
```

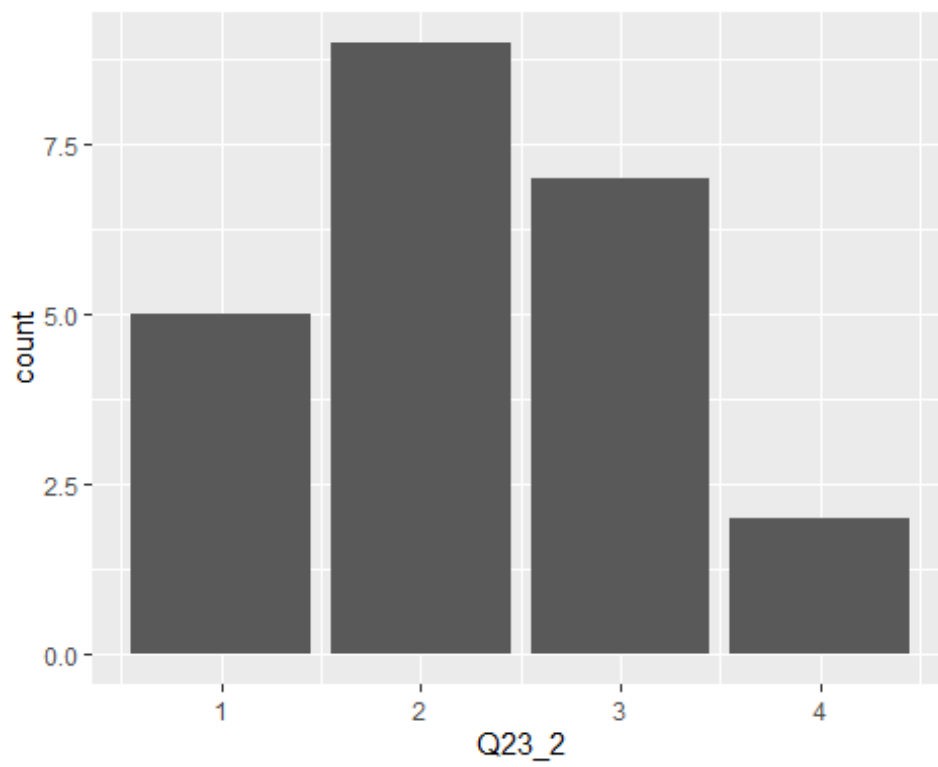
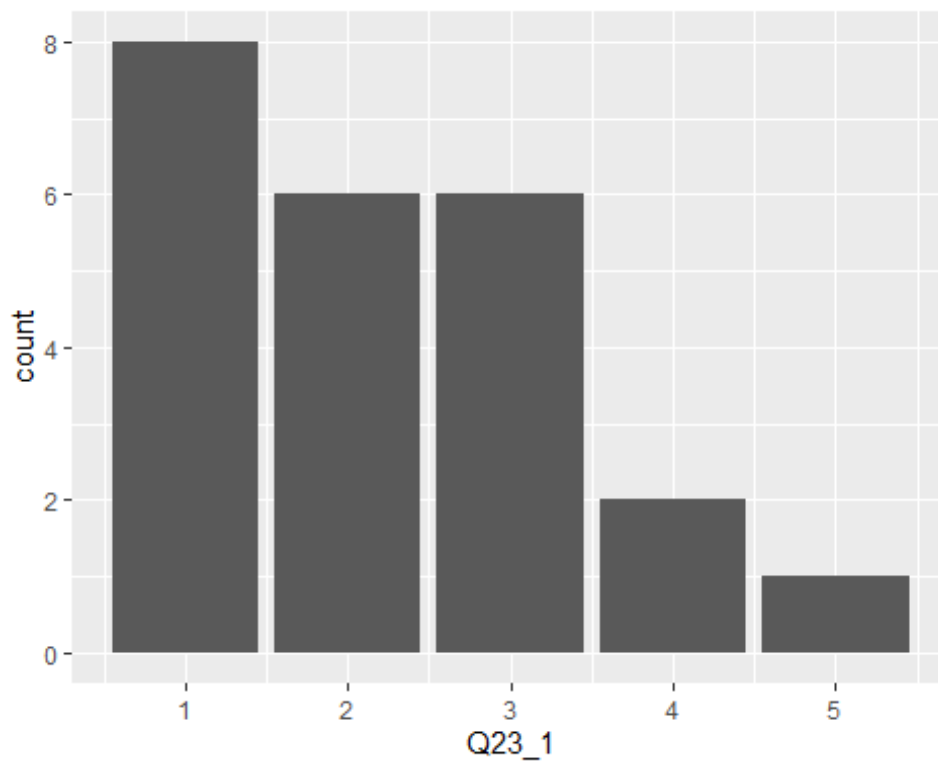


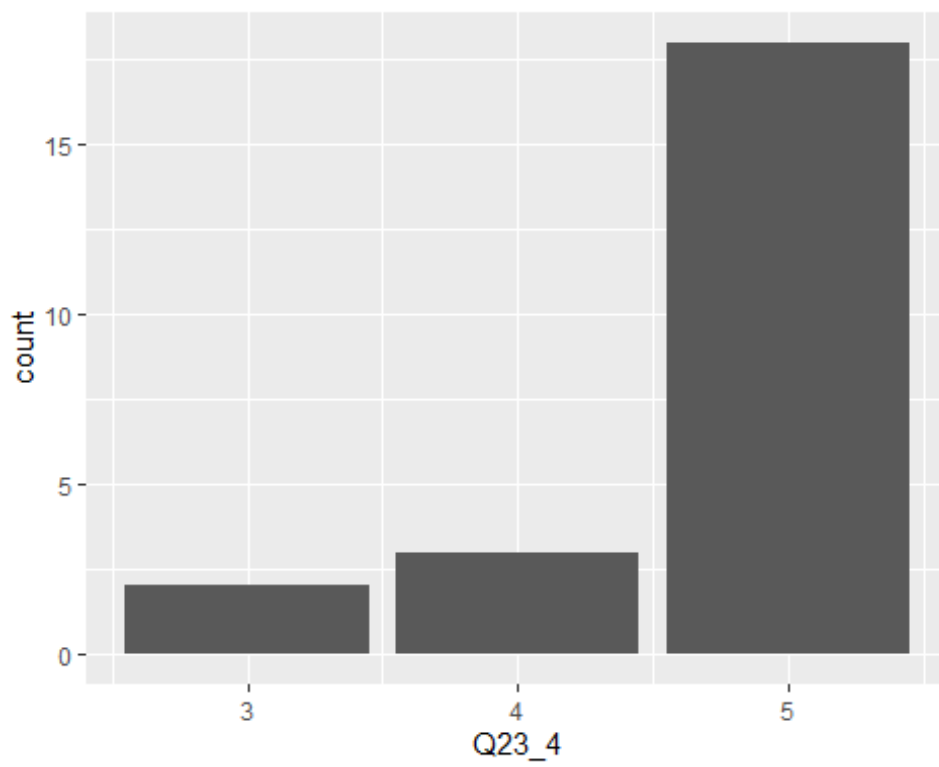
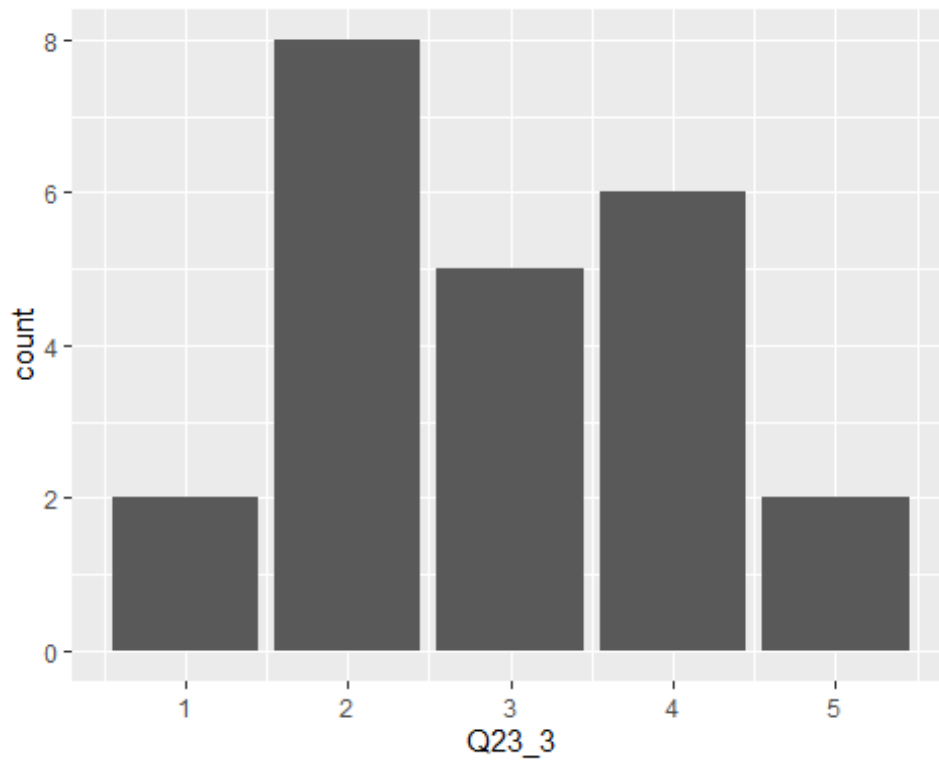
```
Max.      :5.0
##      Q23_4      Q63      Q64      Q65
## Min.      :1.00  Length:10  Length:10  Length:10
## 1st Qu.:2.00  Class :character  Class :character  Class :character
## Median :2.00  Mode  :character  Mode  :character  Mode  :character
## Mean   :2.40
## 3rd Qu.:2.75
## Max.   :4.00
```

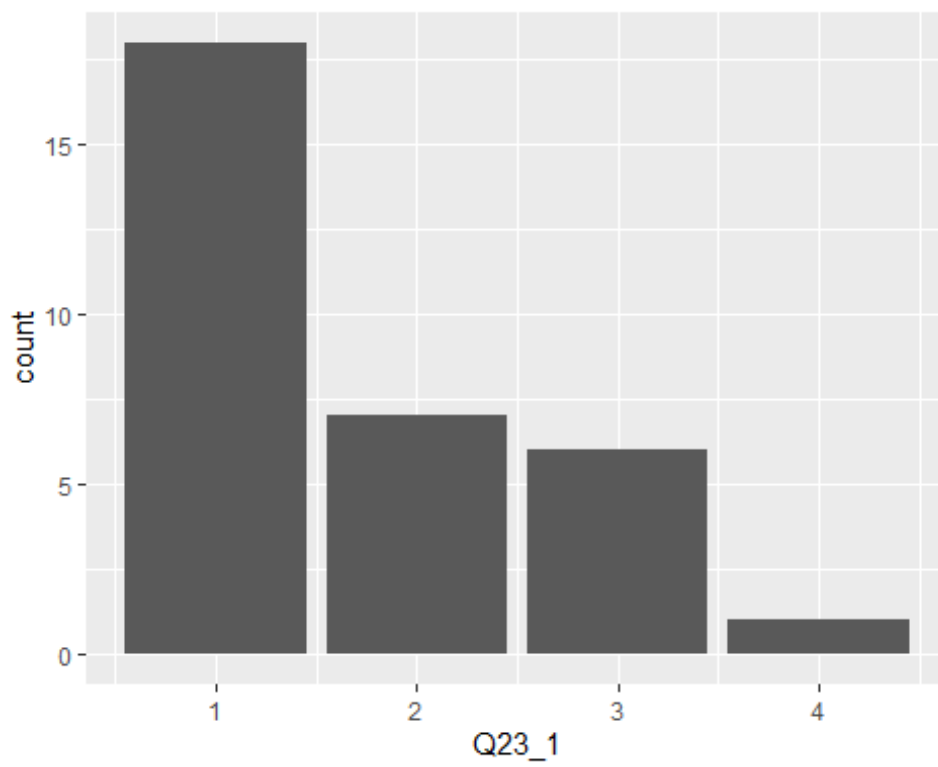
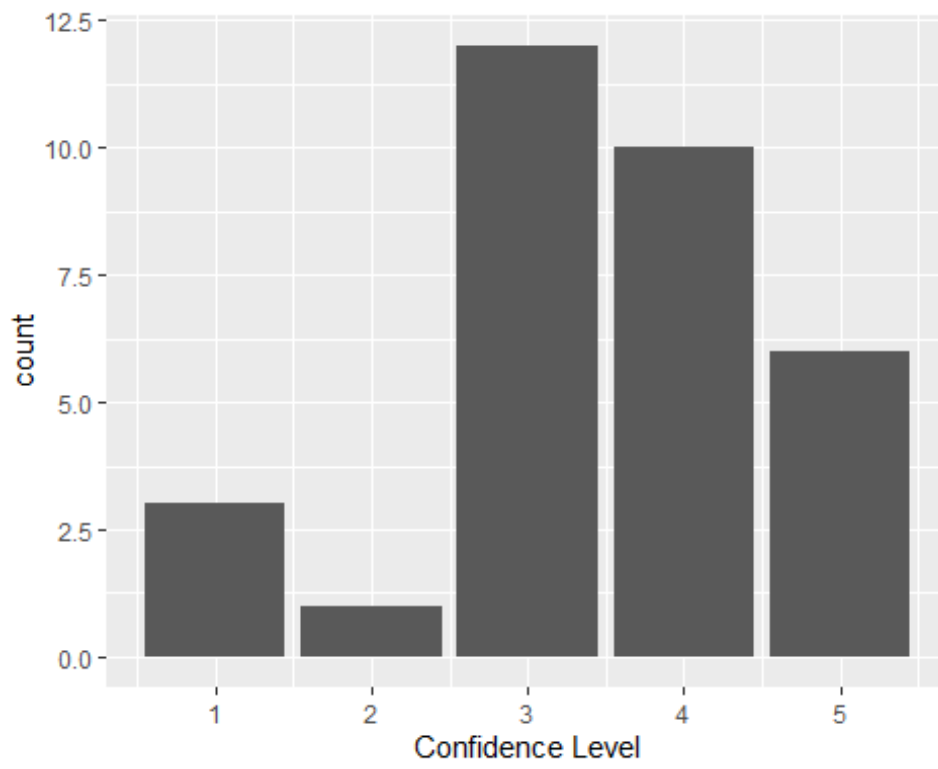


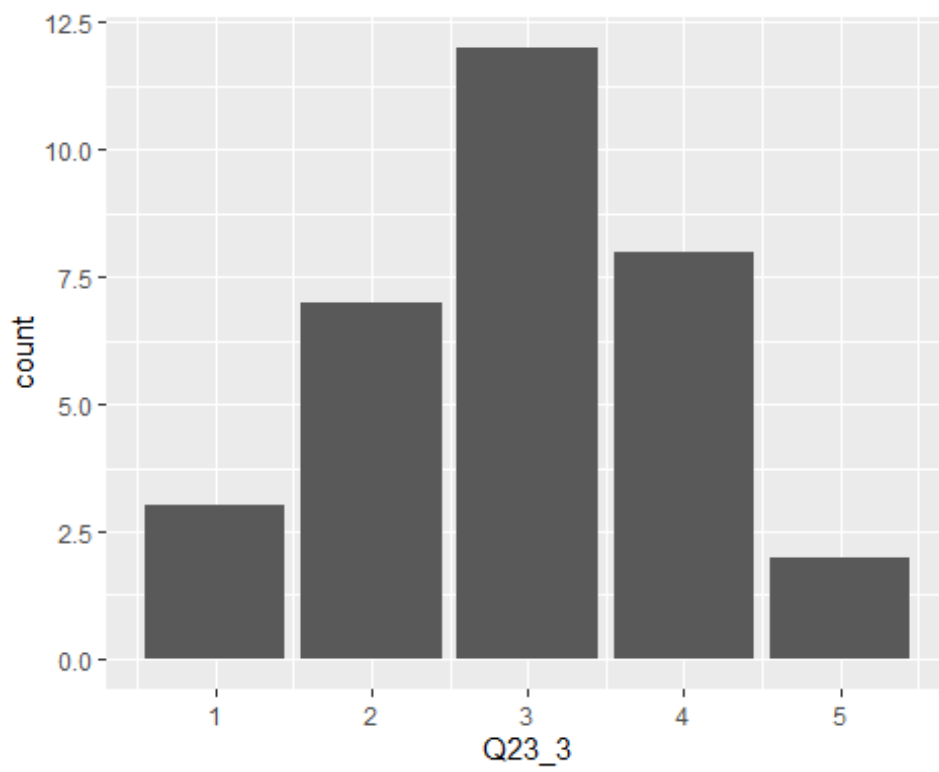
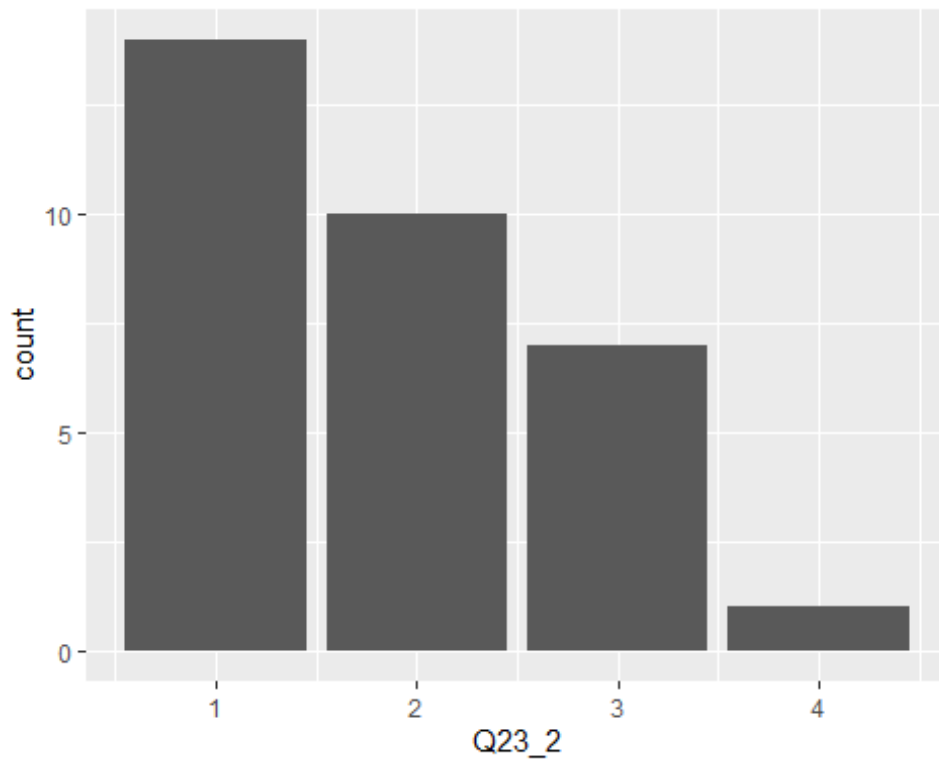


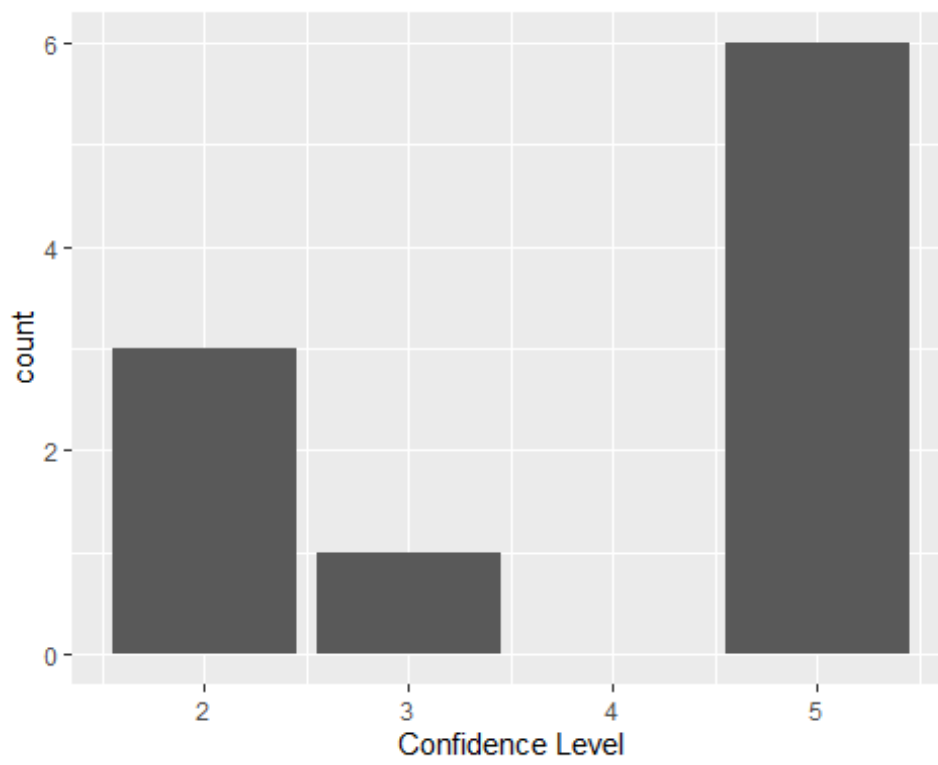
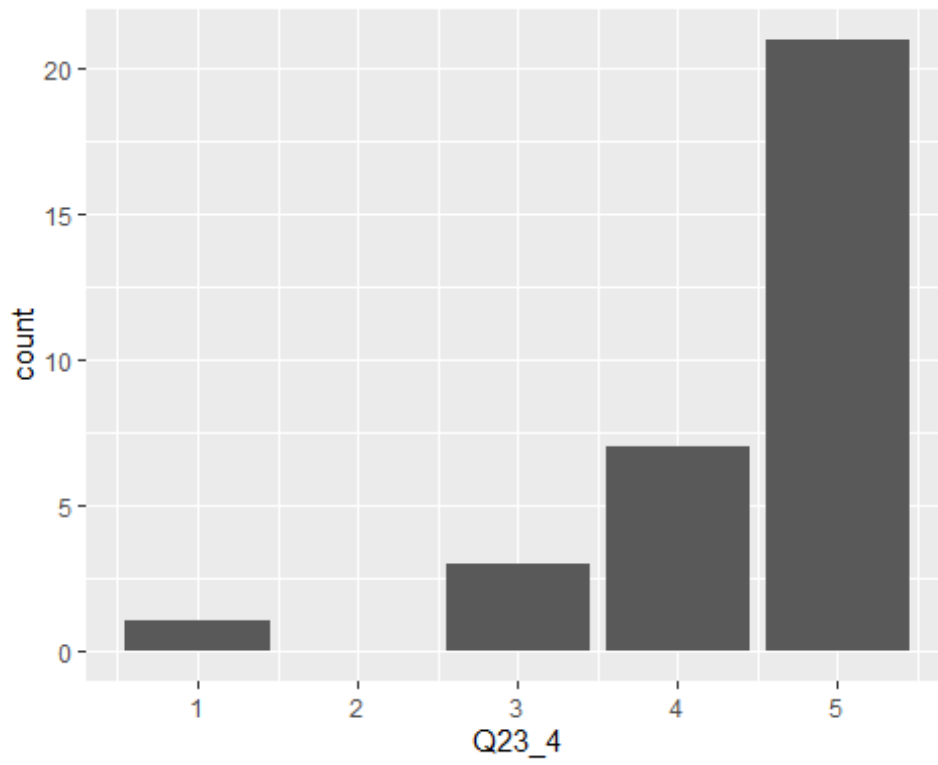




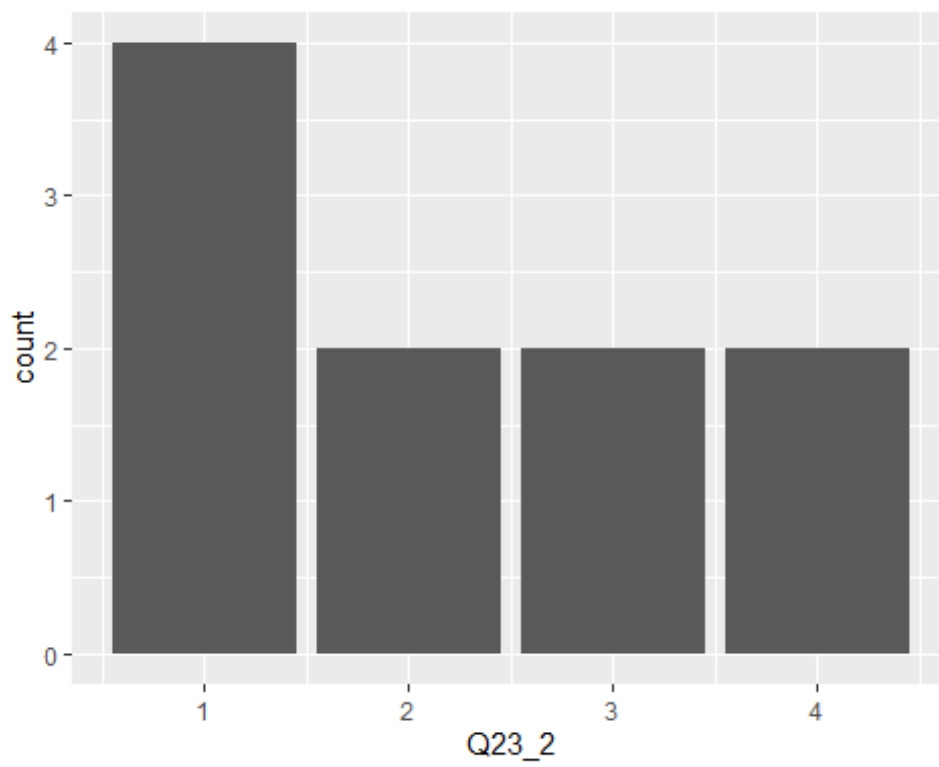
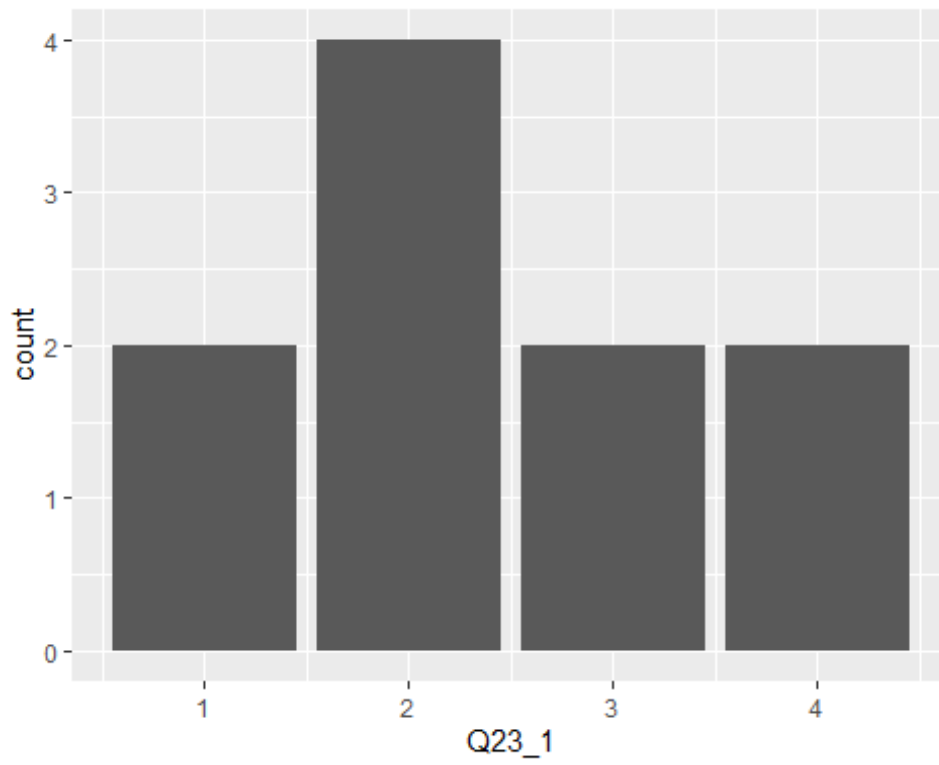


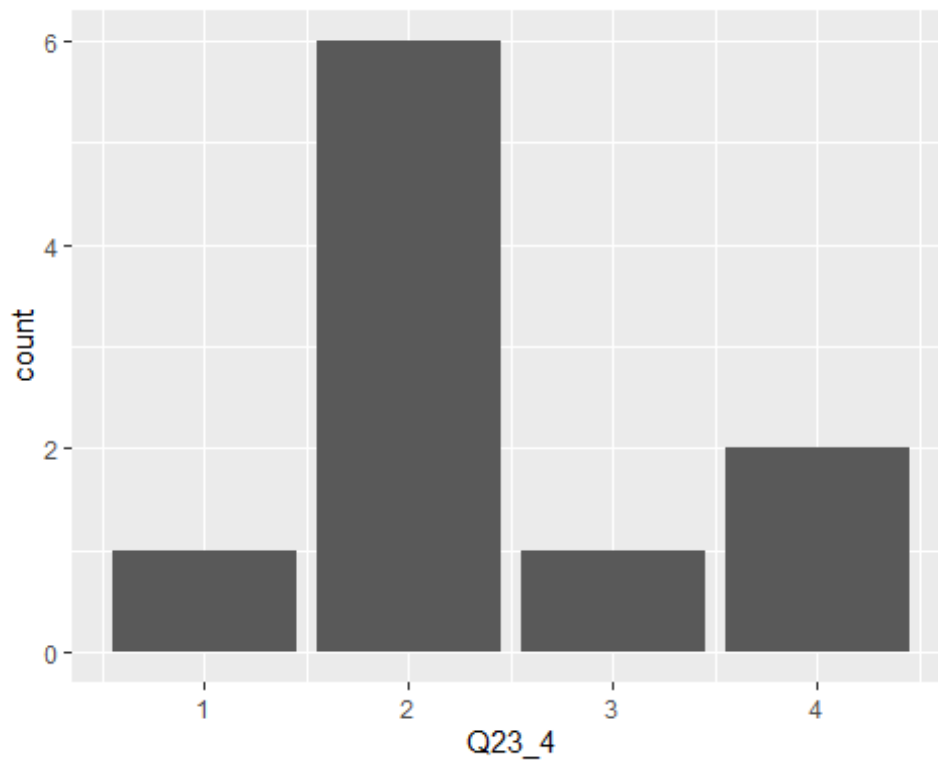
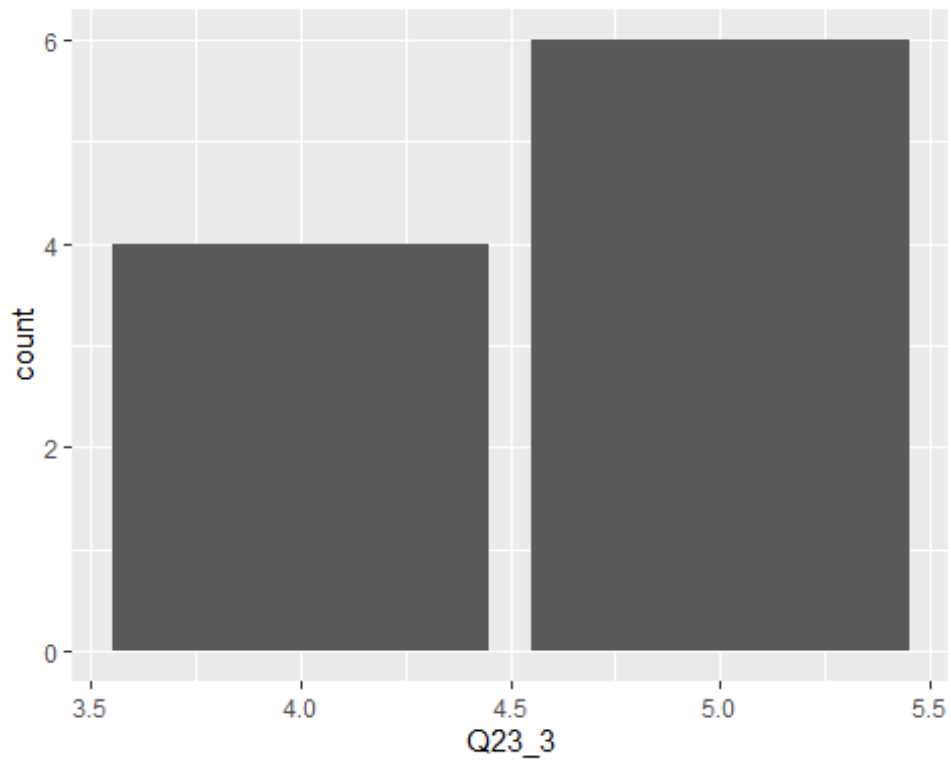












Statistics such as mean, median and plots for the attribute questions for TripAdvisor.



```
## Progress          Duration..in.seconds.  Finished
attention_check
## Length:13         Length:13              Length:13      Length:13
## Class :character Class :character       Class :character
Class :character
## Mode :character  Mode :character        Mode :character
Mode :character
##
```

```

##
##
## Q63_First.Click Q63_Last.Click Q63_Page.Submit Q63_Click.Count
## Min. : 0.000 Min. : 0.000 Min. : 4.830 Min. : 0.000
## 1st Qu.: 3.681 1st Qu.: 7.281 1st Qu.: 9.179 1st Qu.: 1.000
## Median : 5.629 Median : 8.296 Median :11.210 Median : 1.000
## Mean :11.263 Mean :16.032 Mean :20.396 Mean : 3.385
## 3rd Qu.:10.016 3rd Qu.:12.240 3rd Qu.:27.095 3rd Qu.: 3.000
## Max. :59.498 Max. :79.412 Max. :83.334 Max. :20.000
## Q2_1 Q2_2 Q2_3 Q2_4
## Min. :2.000 Min. :2.000 Min. :2.000 Min. :2.000
## 1st Qu.:5.000 1st Qu.:5.000 1st Qu.:4.000 1st Qu.:5.000
## Median :6.000 Median :6.000 Median :6.000 Median :6.000
## Mean :5.538 Mean :5.615 Mean :5.385 Mean :5.538
## 3rd Qu.:6.000 3rd Qu.:7.000 3rd Qu.:6.000 3rd Qu.:7.000
## Max. :7.000 Max. :7.000 Max. :7.000 Max. :7.000
## Q2_5 Q64_First.Click Q64_Last.Click Q64_Page.Submit
## Min. :3.000 Min. : 0.000 Min. : 0.000 Min. : 3.220
## 1st Qu.:4.000 1st Qu.: 1.116 1st Qu.: 2.580 1st Qu.: 8.486
## Median :7.000 Median : 3.849 Median : 3.913 Median :10.430
## Mean :5.692 Mean : 5.630 Mean : 6.474 Mean :11.739
## 3rd Qu.:7.000 3rd Qu.: 5.627 3rd Qu.: 9.626 3rd Qu.:12.678
## Max. :7.000 Max. :19.910 Max. :19.910 Max. :29.450
## Q64_Click.Count Q4_1 Q4_2 Q4_3
## Min. :0.000 Min. :1.000 Min. :2.000 Min. :2.000
## 1st Qu.:1.000 1st Qu.:2.000 1st Qu.:2.000 1st Qu.:2.000
## Median :1.000 Median :3.000 Median :3.000 Median :3.000
## Mean :1.154 Mean :3.077 Mean :3.077 Mean :2.846
## 3rd Qu.:1.000 3rd Qu.:3.000 3rd Qu.:3.000 3rd Qu.:3.000
## Max. :4.000 Max. :6.000 Max. :6.000 Max. :5.000
## Q4_4 Q4_5 Q9 Q10_1
Q11_1
## Min. :1.000 Min. :2.000 Length:13 Min. :2.000
Min. :1
## 1st Qu.:2.000 1st Qu.:3.000 Class :character 1st Qu.:3.000 1st
Qu.:2
## Median :2.000 Median :4.000 Mode :character Median :5.000
Median :3
## Mean :2.538 Mean :3.615 Mean :4.308
Mean :3
## 3rd Qu.:3.000 3rd Qu.:4.000 3rd Qu.:5.000 3rd
Qu.:4
## Max. :4.000 Max. :5.000 Max. :5.000
Max. :5
## Q11_2 Q11_3 Q11_4 Q63
## Min. :1.000 Min. :4.000 Min. :1.000 Length:13
## 1st Qu.:1.000 1st Qu.:4.000 1st Qu.:2.000 Class :character
## Median :1.000 Median :4.000 Median :2.000 Mode :character
## Mean :1.692 Mean :4.462 Mean :2.154
## 3rd Qu.:2.000 3rd Qu.:5.000 3rd Qu.:3.000
## Max. :4.000 Max. :5.000 Max. :4.000
## Q64 Q65
## Length:13 Length:13
## Class :character Class :character

```

```

## Mode :character Mode :character
##
##
##
## Progress Duration..in.seconds. Finished
attention_check
## Length:29 Length:29 Length:29 Length:29
## Class :character Class :character Class :character
Class :character
## Mode :character Mode :character Mode :character
Mode :character
##
##
##
## Q63_First.Click Q63_Last.Click Q63_Page.Submit Q63_Click.Count
## Min. : 0.000 Min. : 0.00 Min. : 6.612 Min. : 0.000
## 1st Qu.: 0.000 1st Qu.: 0.00 1st Qu.: 15.464 1st Qu.: 0.000
## Median : 0.050 Median : 0.05 Median : 22.695 Median : 1.000
## Mean : 7.633 Mean : 12.42 Mean : 31.523 Mean : 2.414
## 3rd Qu.: 8.020 3rd Qu.: 18.80 3rd Qu.: 35.002 3rd Qu.: 3.000
## Max. :102.766 Max. :102.77 Max. :103.337 Max. :13.000
## Q2_1 Q2_2 Q2_3 Q2_4
## Min. :1.000 Min. :1.000 Min. :1.000 Min. :1.000
## 1st Qu.:1.000 1st Qu.:1.000 1st Qu.:1.000 1st Qu.:1.000
## Median :2.000 Median :2.000 Median :2.000 Median :2.000
## Mean :2.379 Mean :2.517 Mean :2.345 Mean :2.345
## 3rd Qu.:3.000 3rd Qu.:4.000 3rd Qu.:3.000 3rd Qu.:4.000
## Max. :6.000 Max. :6.000 Max. :6.000 Max. :5.000
## Q2_5 Q64_First.Click Q64_Last.Click Q64_Page.Submit
## Min. :1.000 Min. : 0.00 Min. : 0.000 Min. : 3.756
## 1st Qu.:2.000 1st Qu.: 0.00 1st Qu.: 0.000 1st Qu.:10.207
## Median :4.000 Median : 0.00 Median : 0.000 Median :14.360
## Mean :3.828 Mean : 3.06 Mean : 4.200 Mean :16.533
## 3rd Qu.:5.000 3rd Qu.: 1.70 3rd Qu.: 4.267 3rd Qu.:19.259
## Max. :7.000 Max. :36.14 Max. :36.136 Max. :54.046
## Q64_Click.Count Q4_1 Q4_2 Q4_3
## Min. : 0.000 Min. :3.000 Min. :3.000 Min. :3.00
## 1st Qu.: 0.000 1st Qu.:5.000 1st Qu.:4.000 1st Qu.:5.00
## Median : 0.000 Median :6.000 Median :5.000 Median :5.00
## Mean : 0.931 Mean :5.655 Mean :5.034 Mean :5.31
## 3rd Qu.: 1.000 3rd Qu.:7.000 3rd Qu.:6.000 3rd Qu.:6.00
## Max. :13.000 Max. :7.000 Max. :7.000 Max. :7.00
## Q4_4 Q4_5 Q9 Q10_1
## Min. :3.000 Min. :2.000 Length:29 Min. :1.000
## 1st Qu.:5.000 1st Qu.:5.000 Class :character 1st Qu.:3.000
## Median :6.000 Median :5.000 Mode :character Median :4.000
## Mean :5.655 Mean :5.207 Mean :3.621
## 3rd Qu.:7.000 3rd Qu.:6.000 3rd Qu.:4.000
## Max. :7.000 Max. :7.000 Max. :5.000
## Q11_1 Q11_2 Q11_3 Q11_4
## Min. :1.000 Min. :1.000 Min. :2.000 Min. :3.00
## 1st Qu.:2.000 1st Qu.:1.000 1st Qu.:3.000 1st Qu.:5.00
## Median :3.000 Median :1.000 Median :3.000 Median :5.00

```

```

## Mean :2.966 Mean :1.552 Mean :3.379 Mean :4.69
## 3rd Qu.:4.000 3rd Qu.:2.000 3rd Qu.:4.000 3rd Qu.:5.00
## Max. :5.000 Max. :3.000 Max. :5.000 Max. :5.00
## Q63 Q64 Q65
## Length:29 Length:29 Length:29
## Class :character Class :character Class :character
## Mode :character Mode :character Mode :character
##
##
## Progress Duration..in.seconds. Finished
attention_check
## Length:35 Length:35 Length:35 Length:35
## Class :character Class :character Class :character
Class :character
## Mode :character Mode :character Mode :character
Mode :character
##
##
##
## Q65_First.Click Q65_Last.Click Q65_Page.Submit Q65_Click.Count
## Min. : 0.000 Min. : 0.000 Min. : 6.714 Min. : 0.000
## 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.:15.143 1st Qu.: 0.000
## Median : 0.000 Median : 0.000 Median :22.024 Median : 0.000
## Mean : 3.253 Mean : 9.286 Mean :23.547 Mean : 2.714
## 3rd Qu.: 3.769 3rd Qu.:19.050 3rd Qu.:27.849 3rd Qu.: 2.500
## Max. :22.979 Max. :44.891 Max. :49.864 Max. :18.000
## Q6_1 Q6_2 Q6_3 Q6_4
## Min. :4.000 Min. :3.000 Min. :3.000 Min. :3.000
## 1st Qu.:5.000 1st Qu.:4.500 1st Qu.:5.000 1st Qu.:5.000
## Median :6.000 Median :5.000 Median :5.000 Median :5.000
## Mean :5.686 Mean :5.229 Mean :5.314 Mean :5.371
## 3rd Qu.:6.000 3rd Qu.:6.000 3rd Qu.:6.000 3rd Qu.:6.000
## Max. :7.000 Max. :7.000 Max. :7.000 Max. :7.000
## Q6_5 Q66_First.Click Q66_Last.Click Q66_Page.Submit
## Min. :3.000 Min. : 0.000 Min. : 0.000 Min. : 4.242
## 1st Qu.:5.000 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.: 11.838
## Median :6.000 Median : 1.412 Median : 4.795 Median : 14.346
## Mean :5.943 Mean : 5.340 Mean : 7.856 Mean : 19.257
## 3rd Qu.:7.000 3rd Qu.: 7.866 3rd Qu.:14.273 3rd Qu.: 21.739
## Max. :7.000 Max. :28.513 Max. :28.513 Max. :113.538
## Q66_Click.Count Q8_1 Q8_2 Q8_3
Q8_4
## Min. : 0.000 Min. :1.000 Min. :1.000 Min. :1.0
Min. :1.0
## 1st Qu.: 0.000 1st Qu.:2.000 1st Qu.:2.000 1st Qu.:2.0 1st
Qu.:2.0
## Median : 1.000 Median :2.000 Median :3.000 Median :2.0
Median :2.0
## Mean : 2.257 Mean :2.371 Mean :3.086 Mean :2.6
Mean :2.6
## 3rd Qu.: 2.500 3rd Qu.:3.000 3rd Qu.:4.000 3rd Qu.:4.0 3rd
Qu.:3.0

```

```

## Max. :15.000 Max. :6.000 Max. :6.000 Max. :5.0
Max. :6.0
## Q8_5 Q9 Q10_1 Q11_1
## Min. :1.000 Length:35 Min. :1.000 Min. :1.000
## 1st Qu.:2.000 Class :character 1st Qu.:3.500 1st Qu.:3.000
## Median :4.000 Mode :character Median :4.000 Median :4.000
## Mean :3.543 Mean :3.714 Mean :3.371
## 3rd Qu.:4.500 3rd Qu.:4.000 3rd Qu.:4.000
## Max. :7.000 Max. :5.000 Max. :5.000
## Q11_2 Q11_3 Q11_4 Q63
## Min. :1.000 Min. :1.000 Min. :3.000 Length:35
## 1st Qu.:1.000 1st Qu.:2.000 1st Qu.:4.000 Class :character
## Median :1.000 Median :3.000 Median :5.000 Mode :character
## Mean :1.543 Mean :2.914 Mean :4.629
## 3rd Qu.:2.000 3rd Qu.:4.000 3rd Qu.:5.000
## Max. :5.000 Max. :5.000 Max. :5.000
## Q64 Q65
## Length:35 Length:35
## Class :character Class :character
## Mode :character Mode :character
##
##
## Progress Duration..in.seconds. Finished
attention_check
## Length:10 Length:10 Length:10 Length:10
## Class :character Class :character Class :character
Class :character
## Mode :character Mode :character Mode :character
Mode :character
##
##
##
## Q65_First.Click Q65_Last.Click Q65_Page.Submit Q65_Click.Count
## Min. : 0.000 Min. : 0.000 Min. : 2.895 Min. : 0.0
## 1st Qu.: 4.338 1st Qu.: 8.185 1st Qu.:12.348 1st Qu.: 1.0
## Median : 8.758 Median :12.557 Median :17.255 Median : 1.0
## Mean :11.971 Mean :15.292 Mean :19.605 Mean : 2.6
## 3rd Qu.:14.804 3rd Qu.:23.758 3rd Qu.:25.593 3rd Qu.: 2.5
## Max. :34.388 Max. :34.388 Max. :42.740 Max. :12.0
## Q6_1 Q6_2 Q6_3 Q6_4 Q6_5
## Min. :2.00 Min. :2.0 Min. :2.00 Min. :1.00 Min. :2.0
## 1st Qu.:3.00 1st Qu.:3.0 1st Qu.:2.25 1st Qu.:2.25 1st Qu.:4.0
## Median :3.00 Median :4.0 Median :3.00 Median :3.00 Median :5.0
## Mean :3.20 Mean :3.5 Mean :3.00 Mean :2.80 Mean :4.6
## 3rd Qu.:3.75 3rd Qu.:4.0 3rd Qu.:3.00 3rd Qu.:3.00 3rd Qu.:5.0
## Max. :5.00 Max. :5.0 Max. :5.00 Max. :4.00 Max. :6.0
## Q66_First.Click Q66_Last.Click Q66_Page.Submit Q66_Click.Count
## Min. : 0.000 Min. : 0.000 Min. : 2.179 Min. : 0.0
## 1st Qu.: 0.775 1st Qu.: 3.174 1st Qu.:10.710 1st Qu.: 1.0
## Median : 5.646 Median :10.360 Median :15.771 Median : 1.0
## Mean : 9.168 Mean :14.012 Mean :18.581 Mean : 2.3
## 3rd Qu.:11.103 3rd Qu.:24.368 3rd Qu.:25.355 3rd Qu.: 2.0

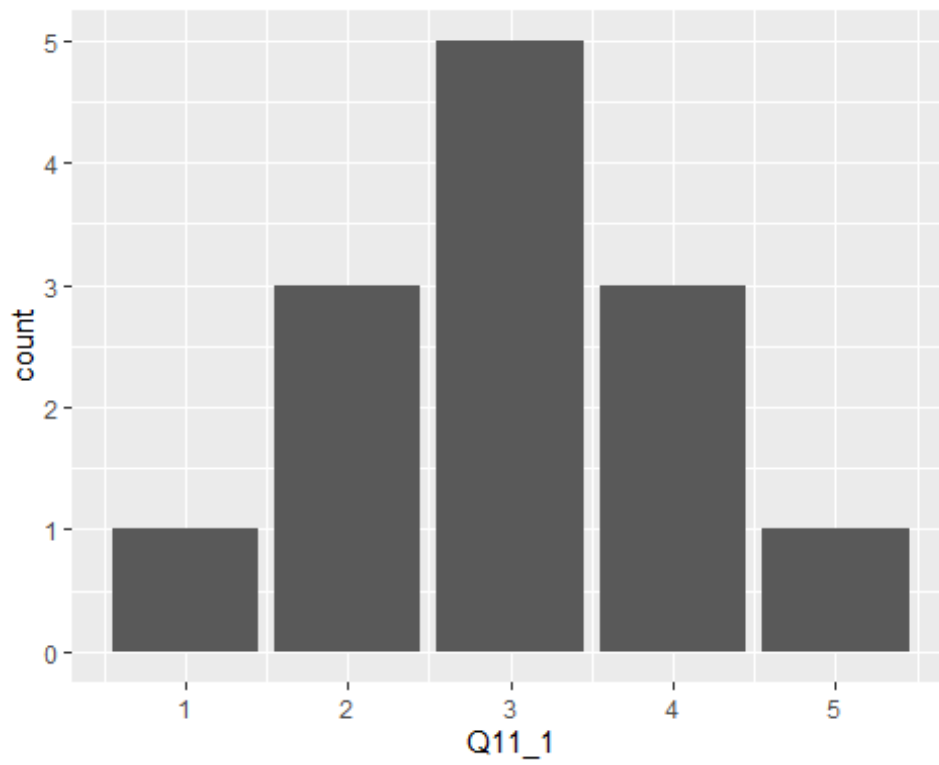
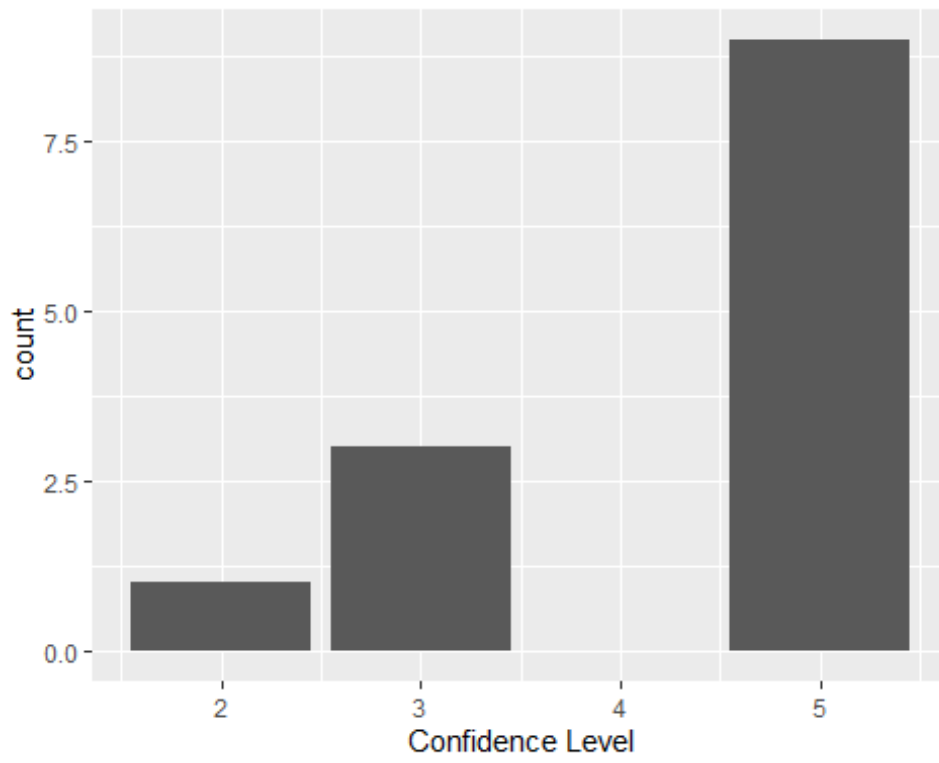
```

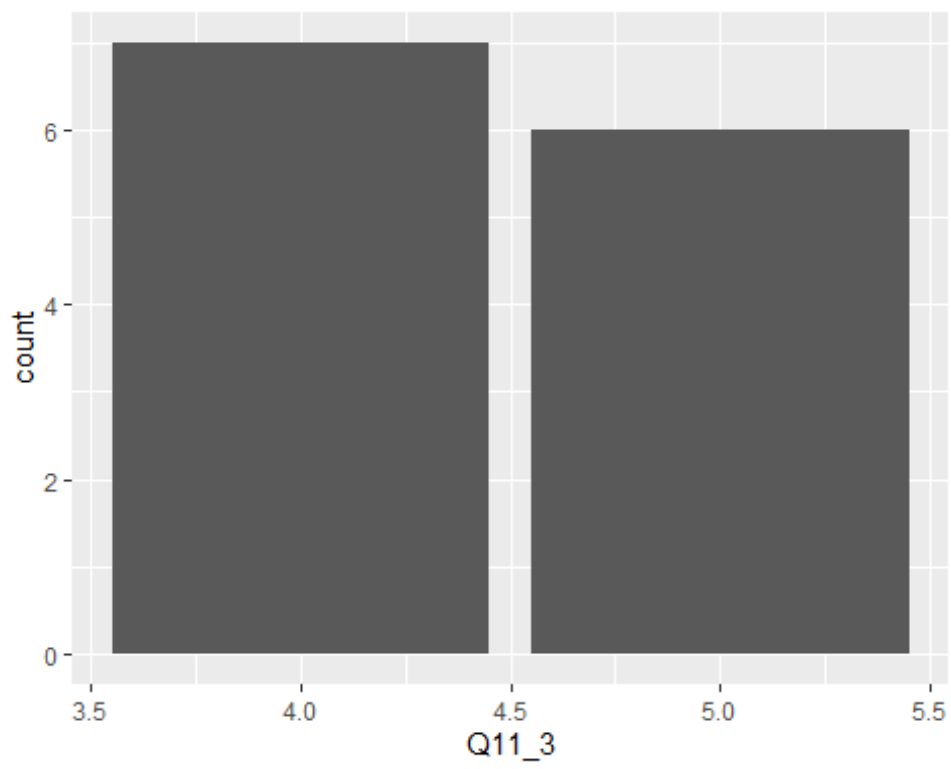
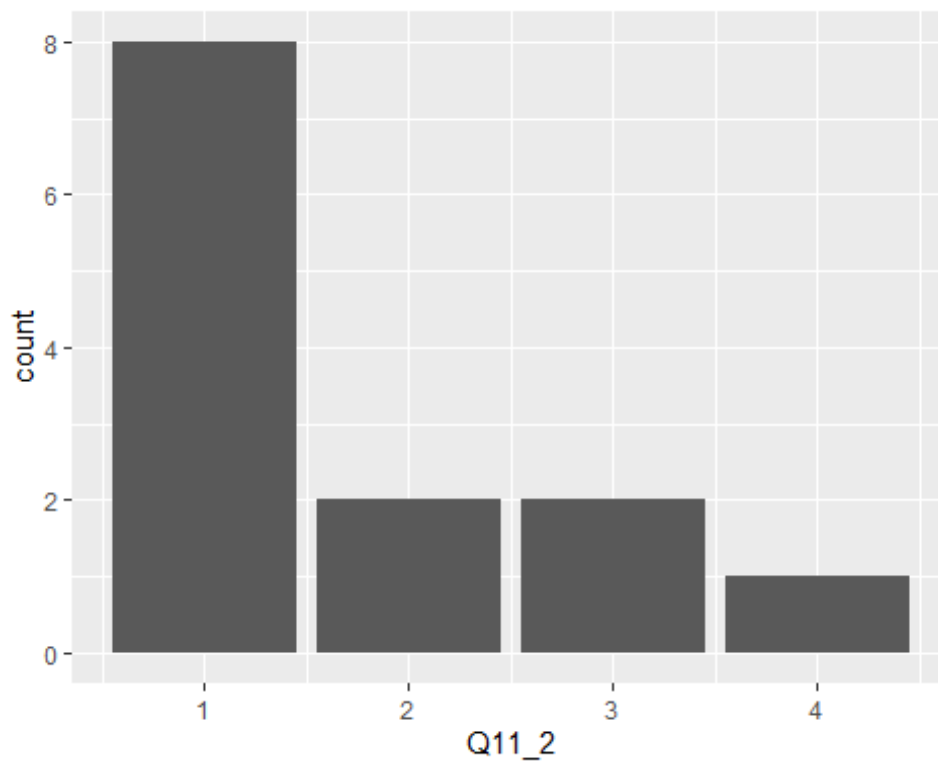
```

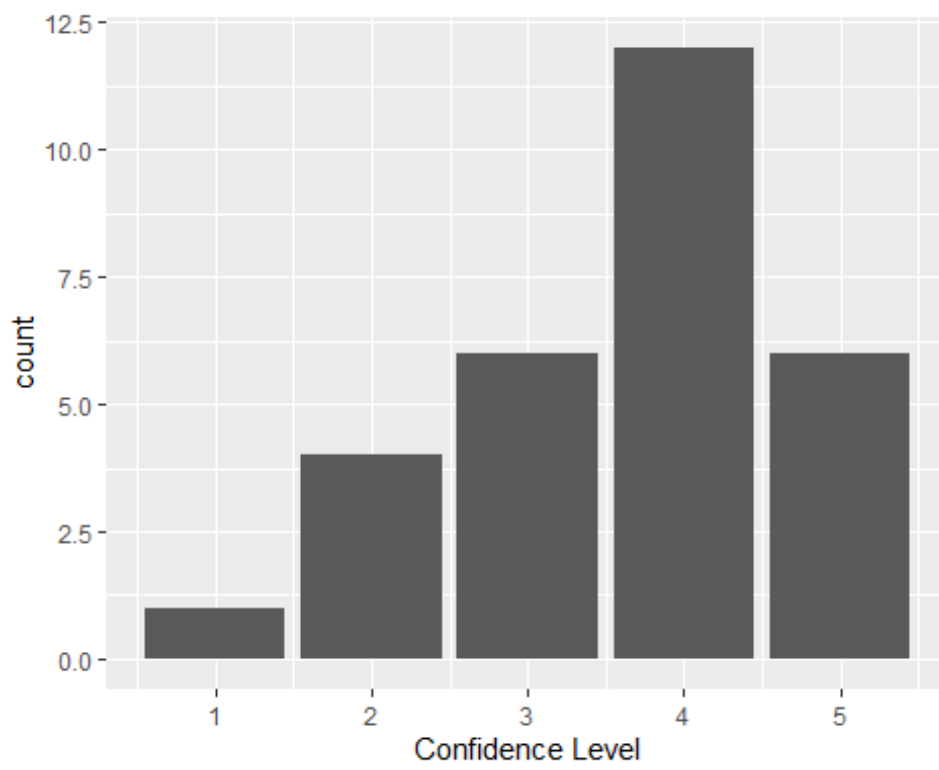
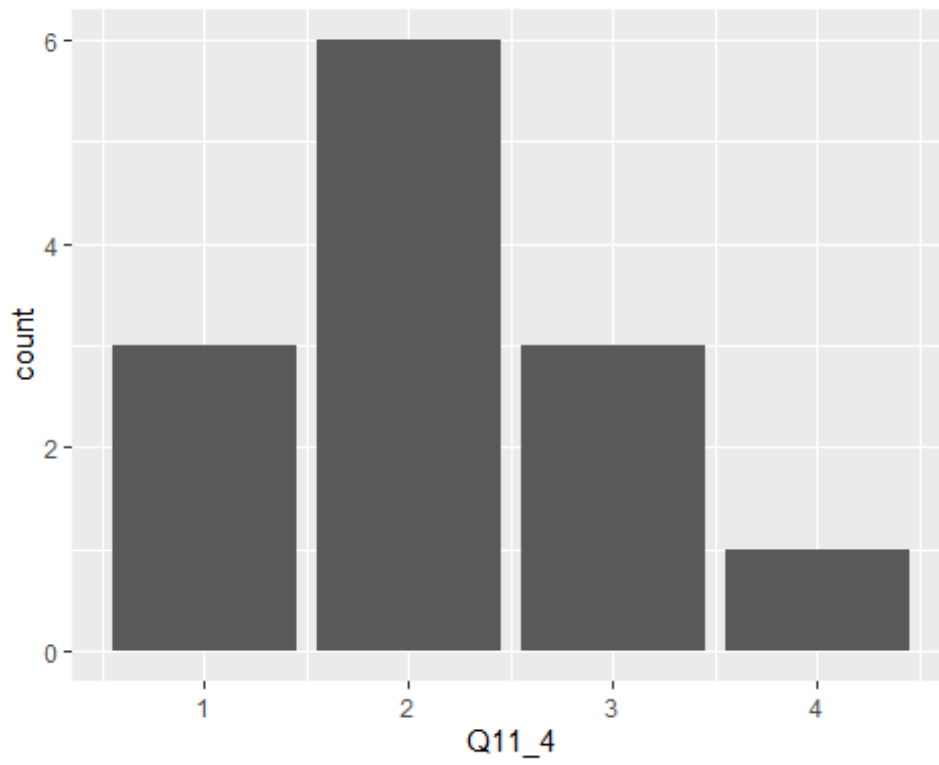
## Max. :31.508 Max. :35.613 Max. :39.975 Max. :11.0
## Q8_1 Q8_2 Q8_3 Q8_4 Q8_5
## Min. :4.00 Min. :4.00 Min. :4.00 Min. :4.0
Min. :4.00
## 1st Qu.:4.25 1st Qu.:5.25 1st Qu.:4.00 1st Qu.:5.0 1st
Qu.:5.25
## Median :6.00 Median :6.00 Median :6.00 Median :6.0
Median :7.00
## Mean :5.70 Mean :5.80 Mean :5.50 Mean :5.8
Mean :6.10
## 3rd Qu.:7.00 3rd Qu.:6.00 3rd Qu.:6.75 3rd Qu.:7.0 3rd
Qu.:7.00
## Max. :7.00 Max. :7.00 Max. :7.00 Max. :7.0
Max. :7.00
## Q9 Q10_1 Q11_1 Q11_2 Q11_3
## Length:10 Min. :3.0 Min. :2.0 Min. :1.0
Min. :4.0
## Class :character 1st Qu.:3.5 1st Qu.:3.0 1st Qu.:1.0 1st
Qu.:5.0
## Mode :character Median :5.0 Median :3.0 Median :2.0
Median :5.0
## Mean :4.4 Mean :3.3 Mean :1.8
Mean :4.8
## 3rd Qu.:5.0 3rd Qu.:4.0 3rd Qu.:2.0 3rd
Qu.:5.0
## Max. :5.0 Max. :5.0 Max. :3.0
Max. :5.0
## Q11_4 Q63 Q64 Q65
## Min. :1.00 Length:10 Length:10 Length:10
## 1st Qu.:2.00 Class :character Class :character Class :character
## Median :2.00 Mode :character Mode :character Mode :character
## Mean :2.40
## 3rd Qu.:2.75
## Max. :5.00

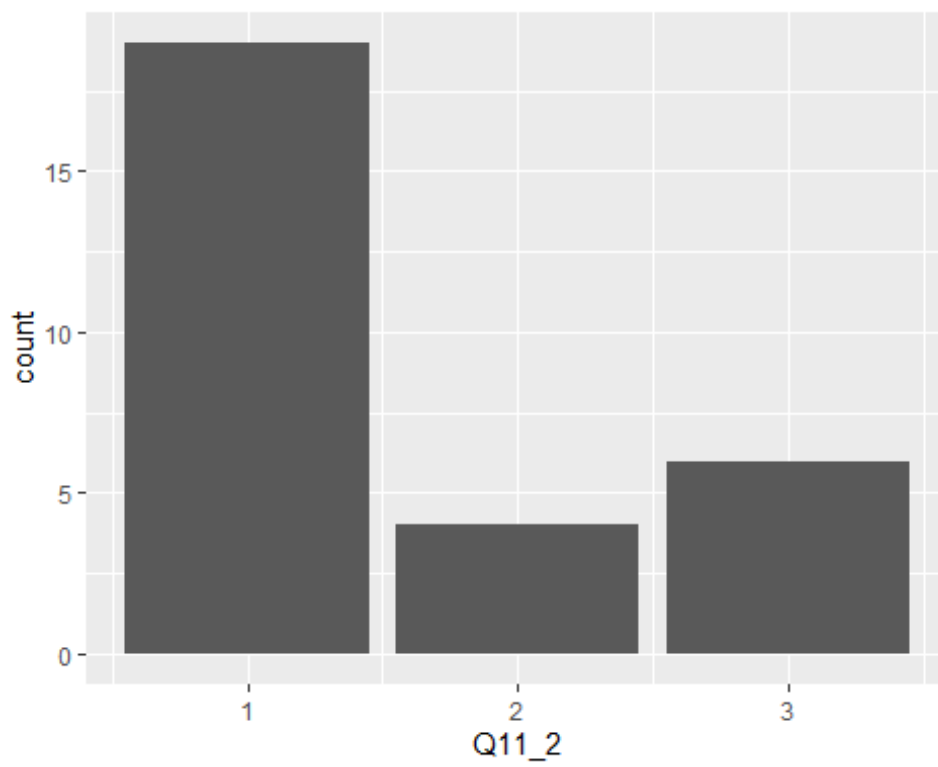
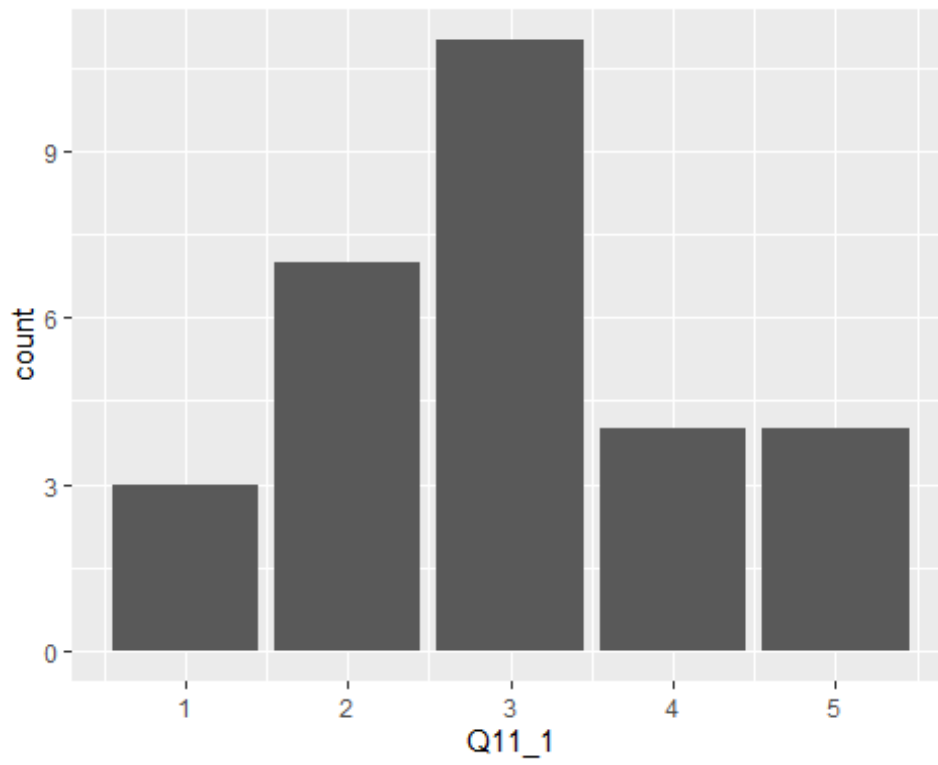
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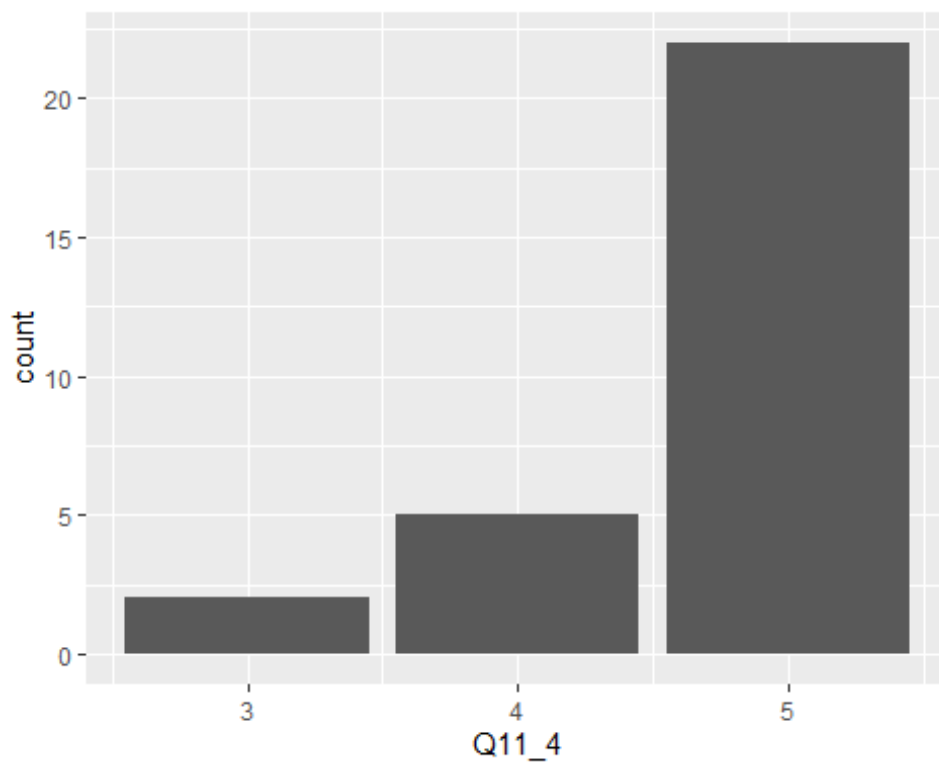
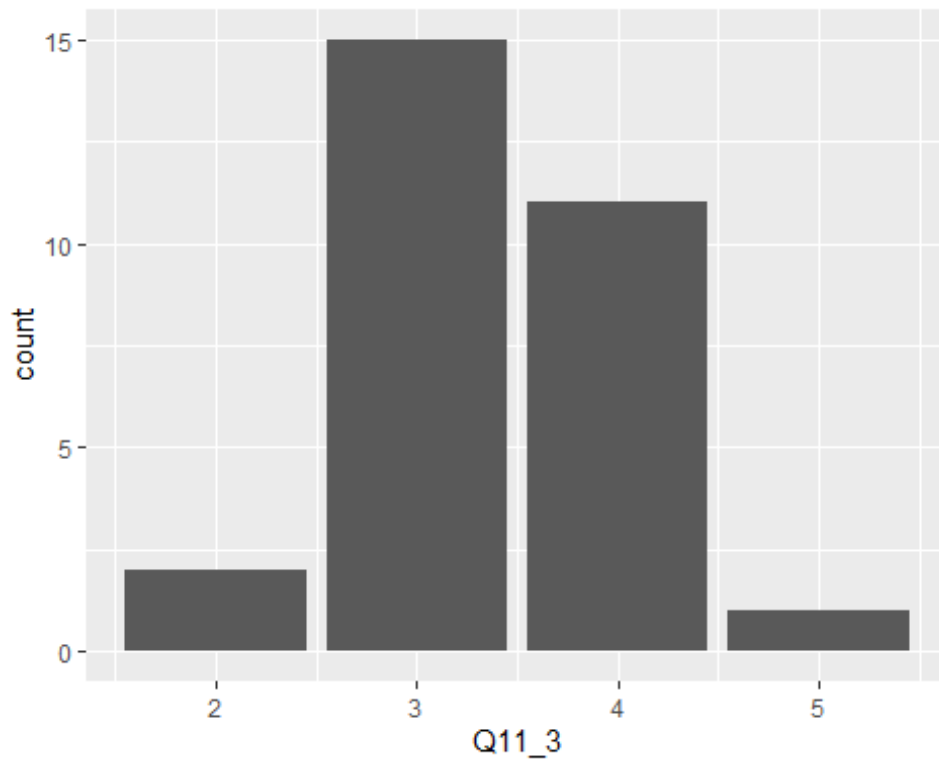


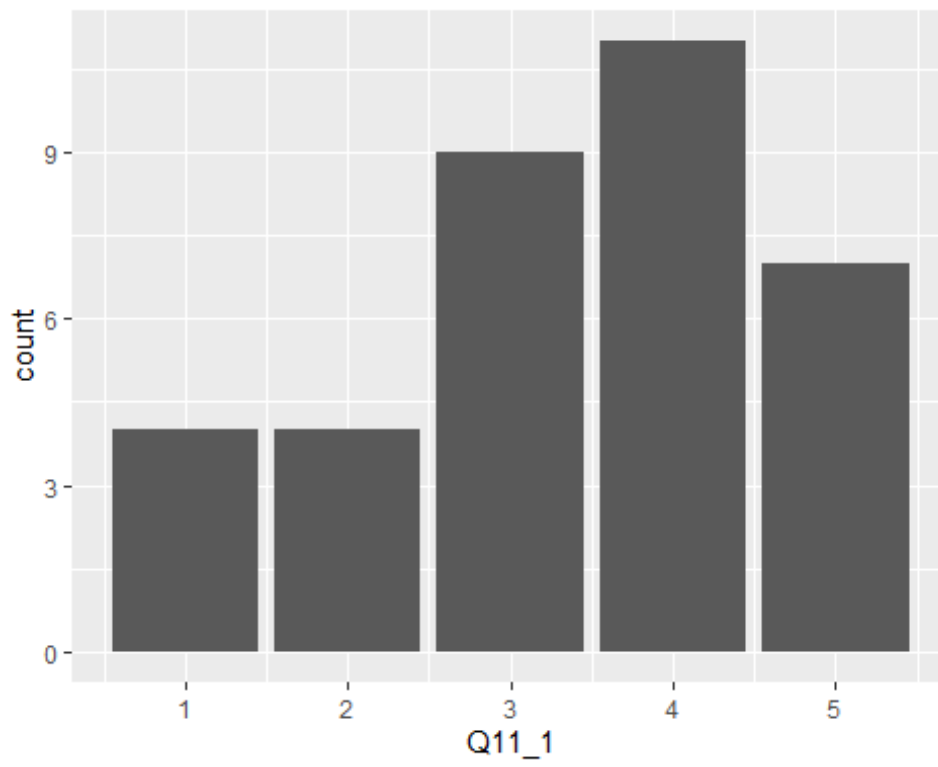
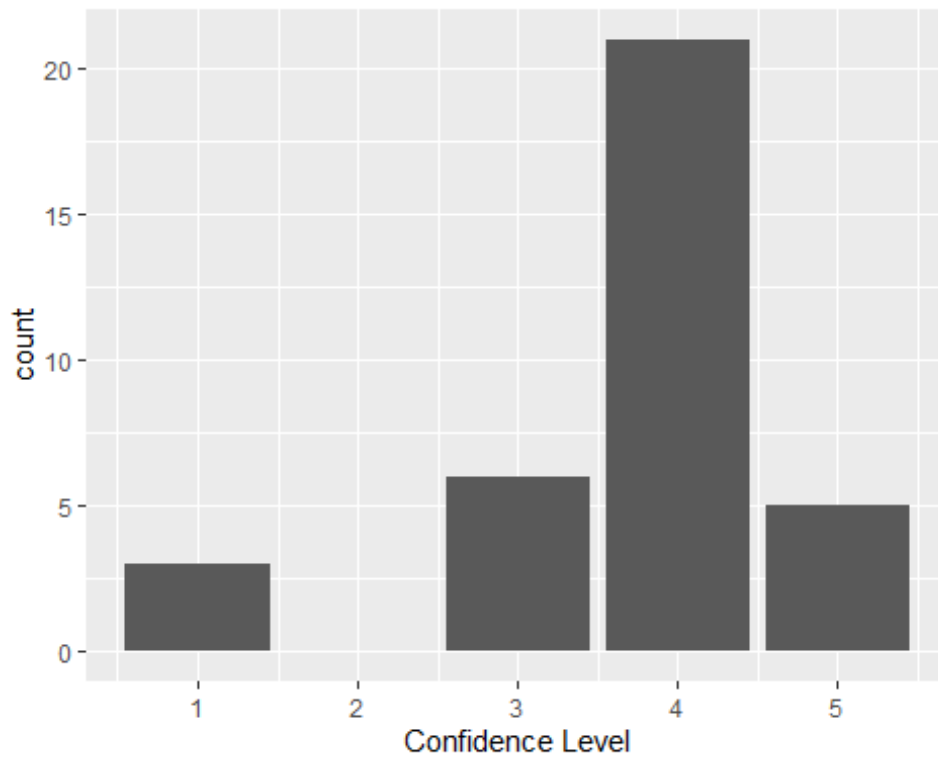


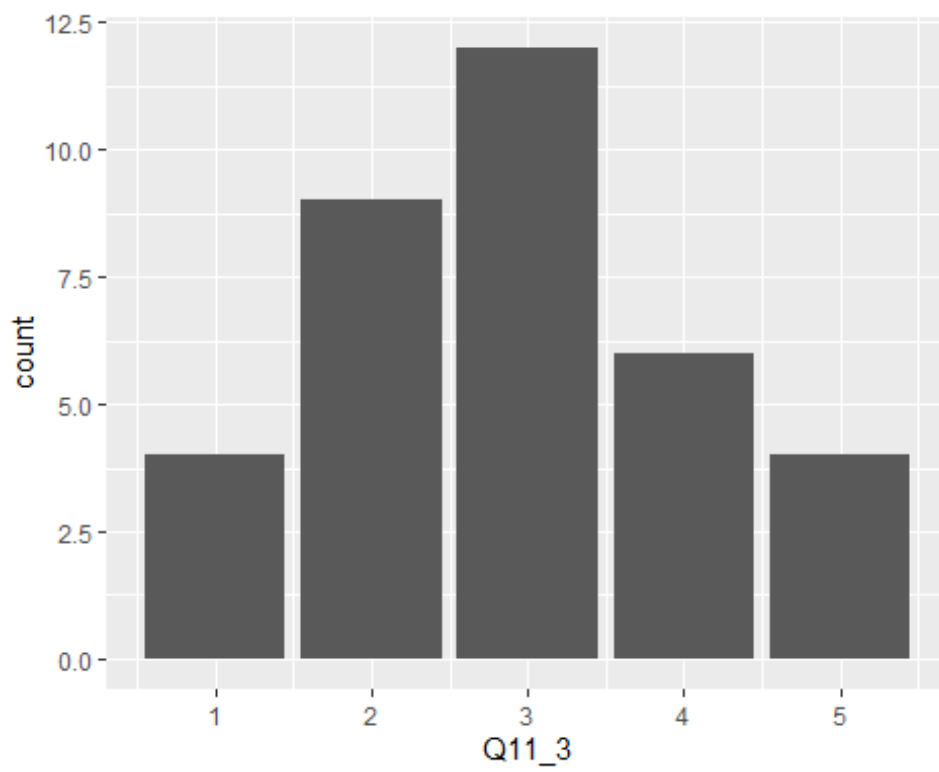
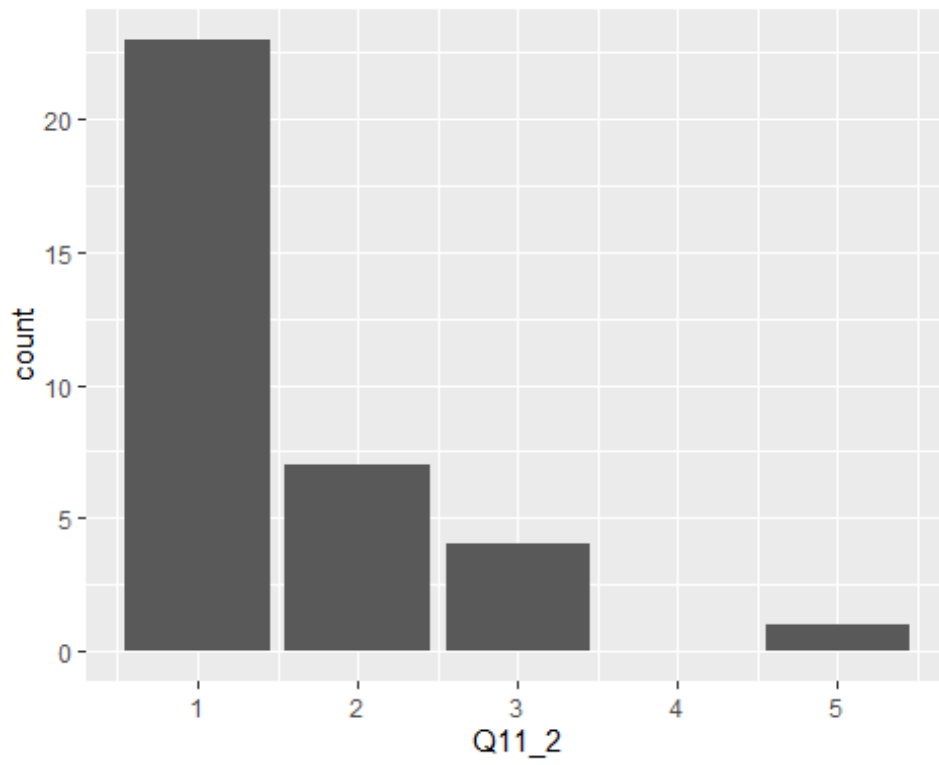


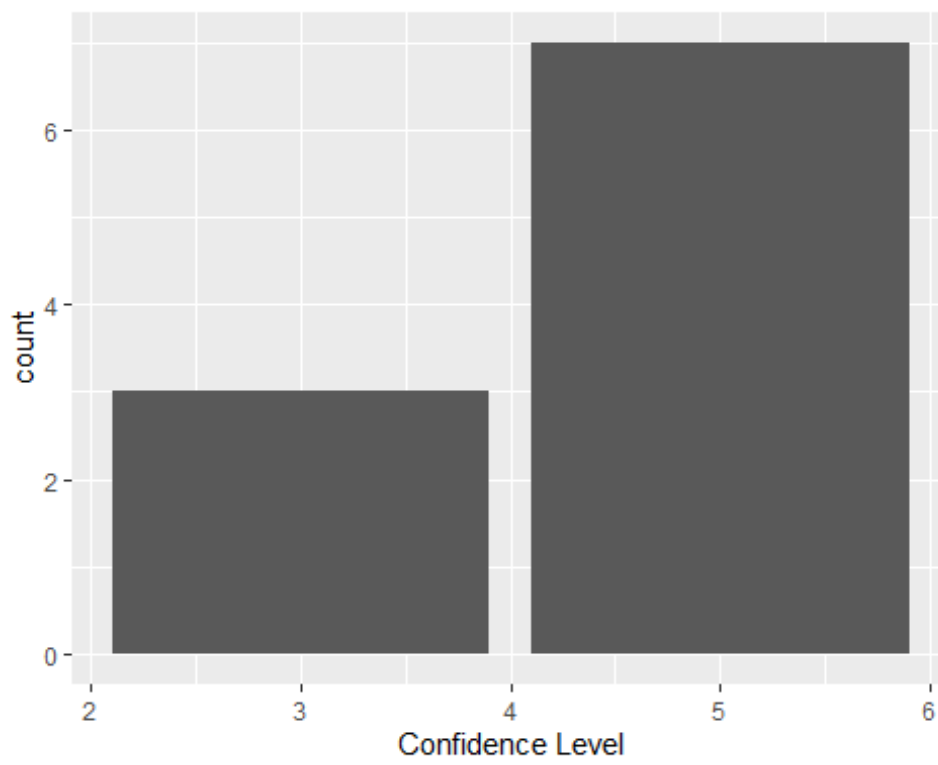
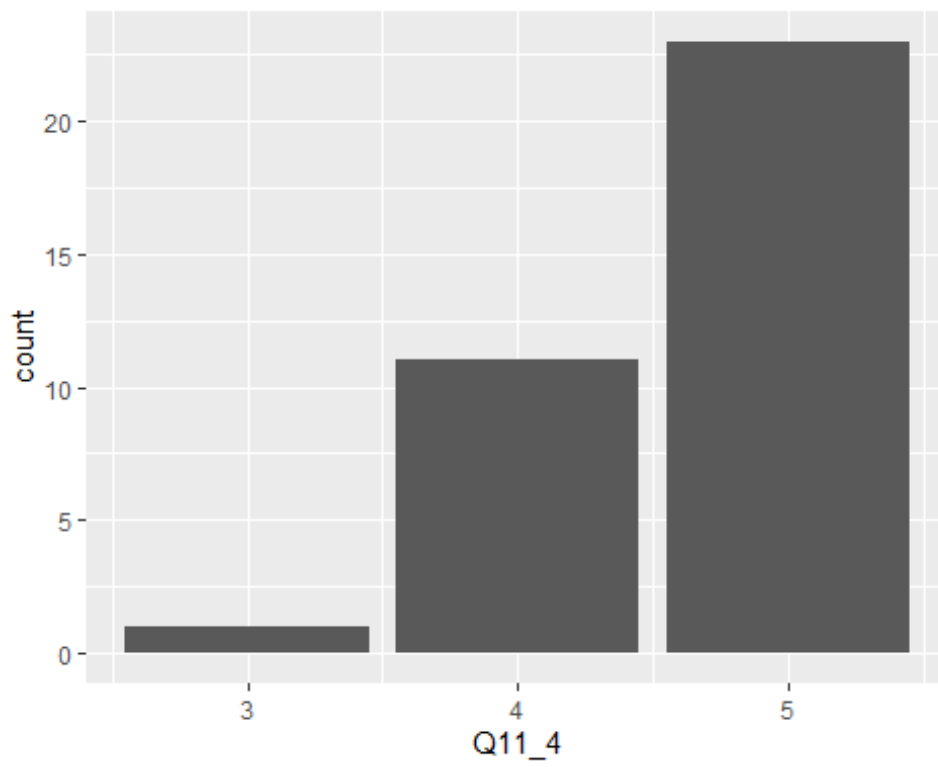




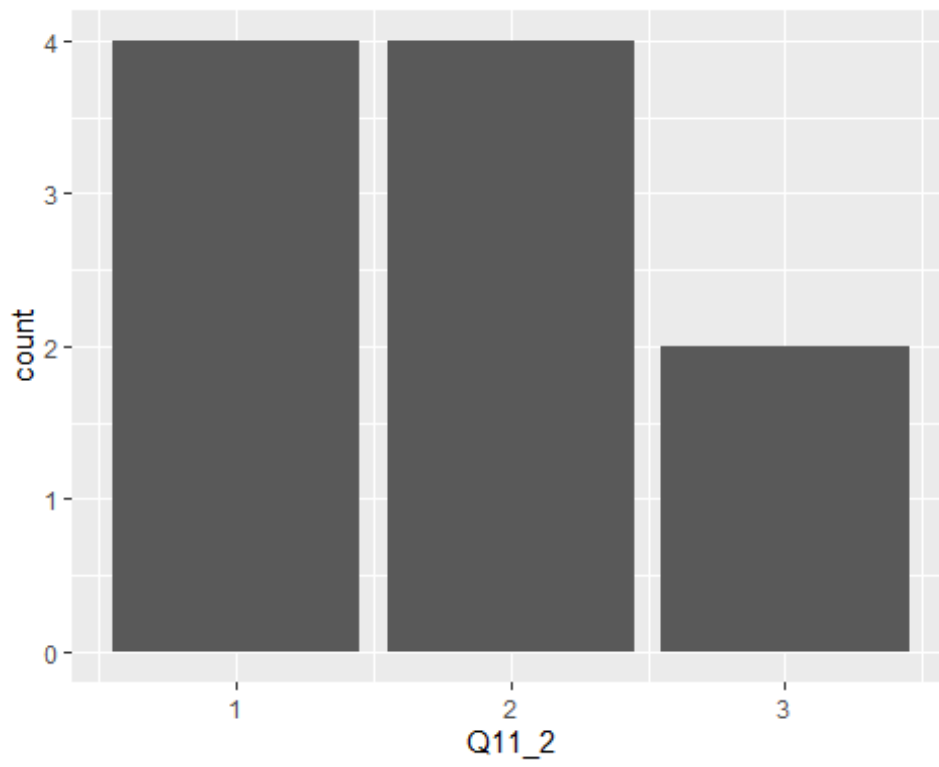
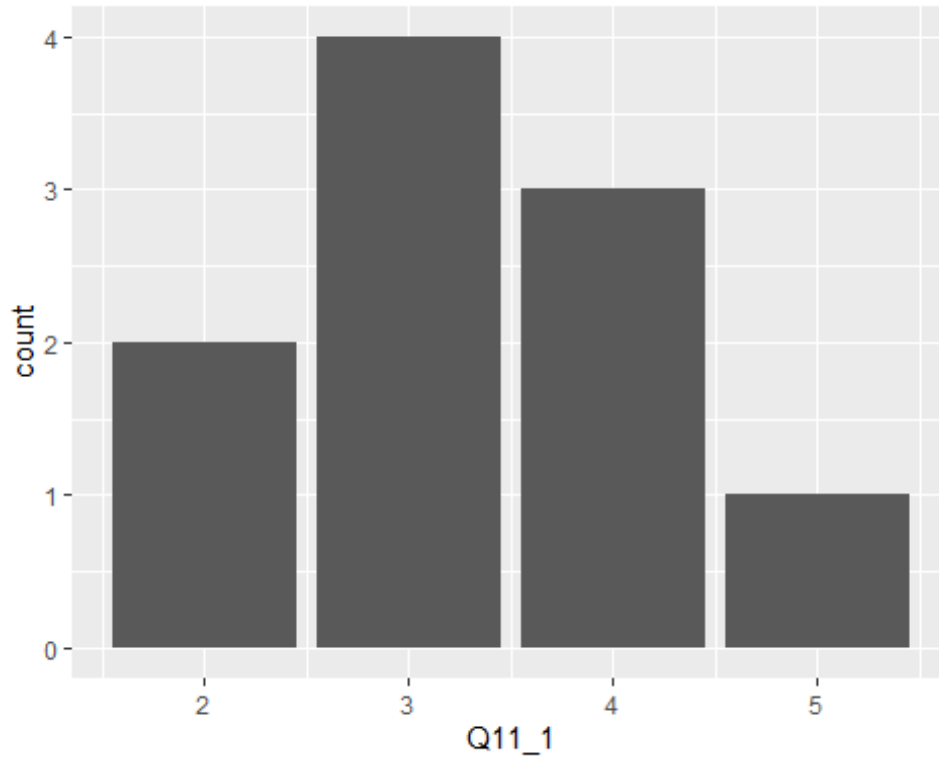


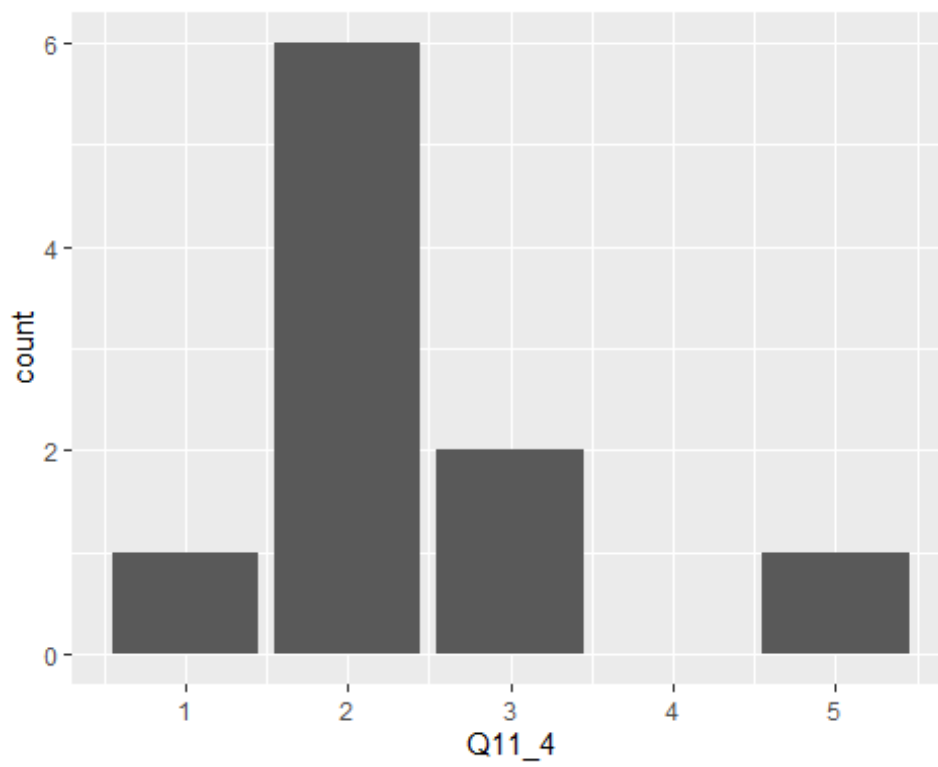
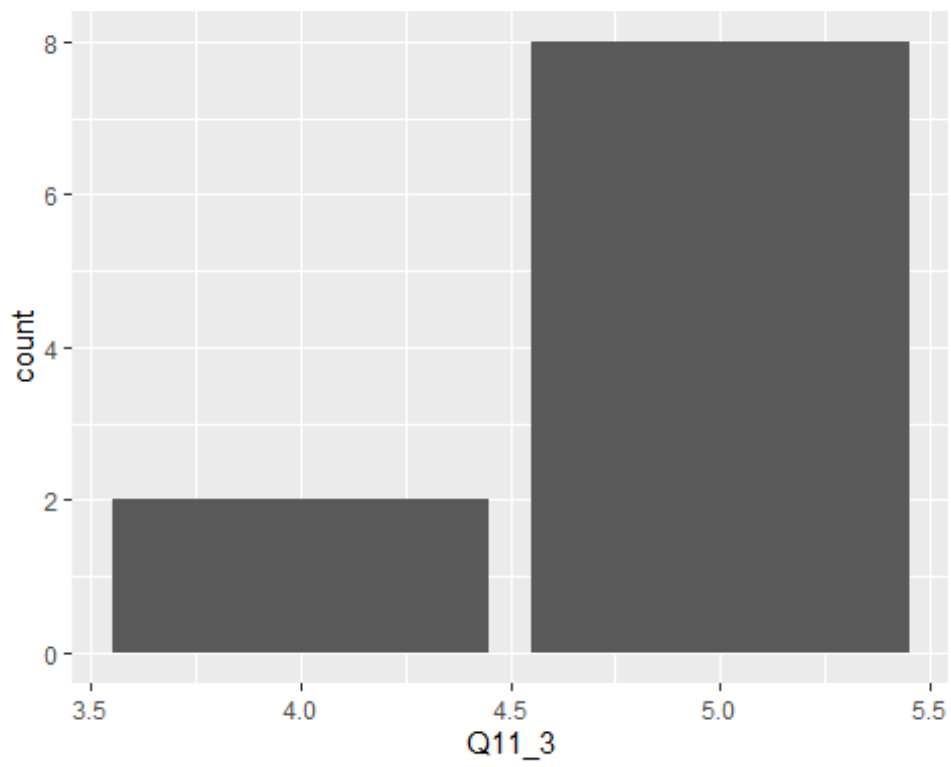


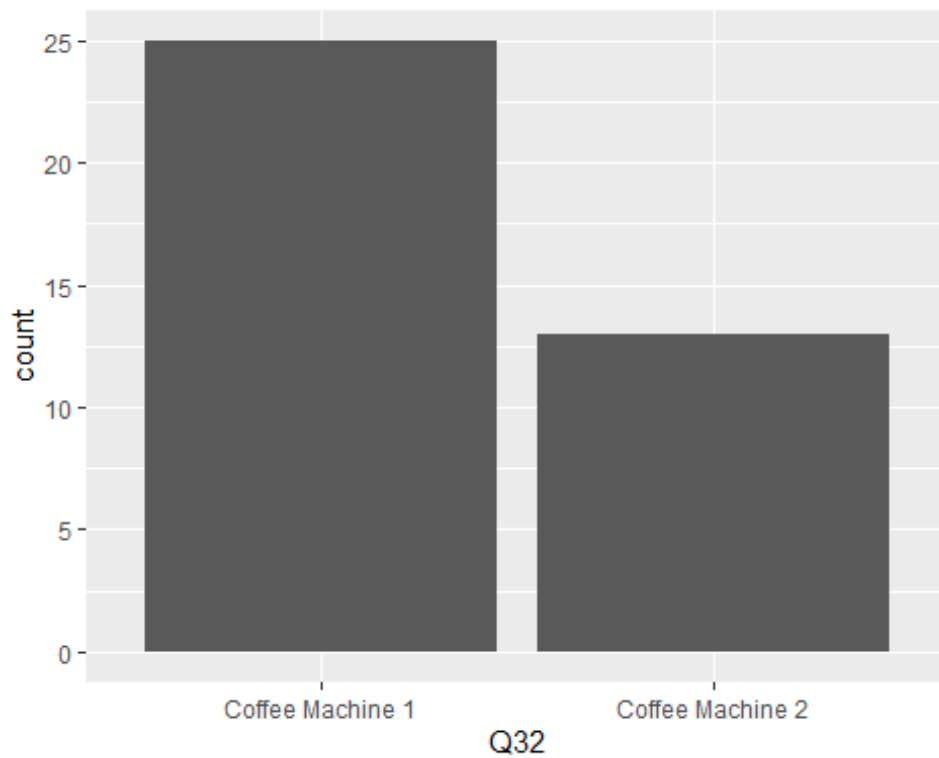
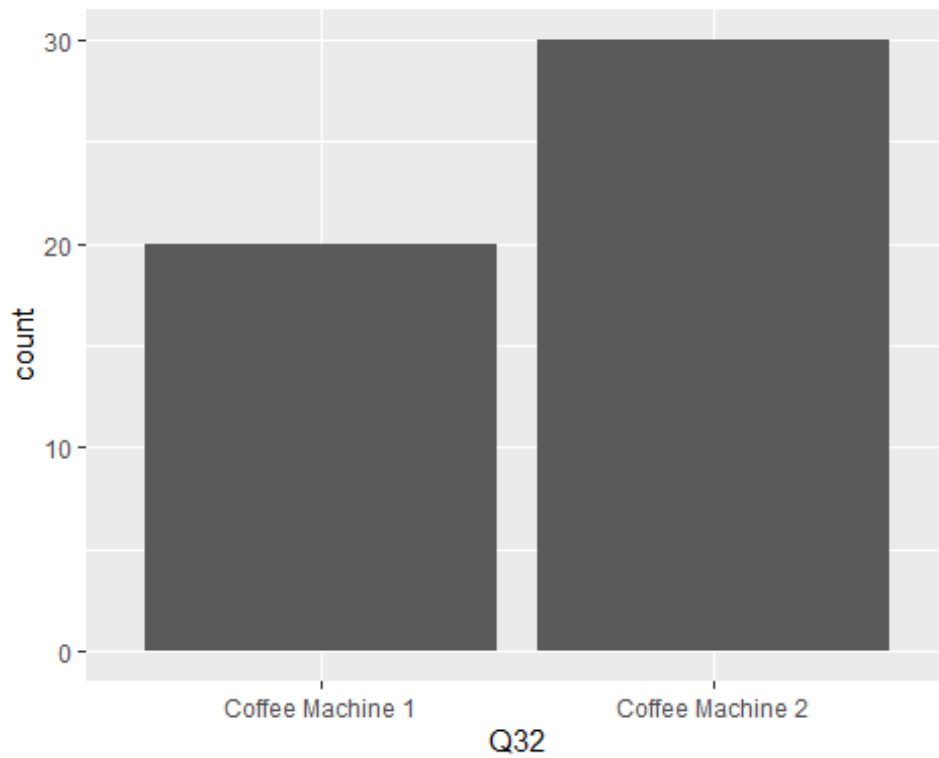












```
## Progress          Duration..in.seconds.  Finished
attention_check
## Length:20         Length:20          Length:20      Length:20
## Class :character Class :character   Class :character
Class :character
## Mode :character  Mode :character   Mode :character
Mode :character
##
```

```

##
##
## Q67_First.Click Q67_Last.Click Q67_Page.Submit Q67_Click.Count
## Min. : 0.000 Min. : 0.000 Min. : 6.742 Min. : 0.00
## 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.:17.245 1st Qu.: 0.00
## Median : 2.524 Median : 3.204 Median :22.519 Median : 1.00
## Mean : 4.403 Mean :13.907 Mean :30.081 Mean : 3.55
## 3rd Qu.: 7.772 3rd Qu.:14.845 3rd Qu.:36.354 3rd Qu.: 2.00
## Max. :17.208 Max. :70.330 Max. :70.865 Max. :26.00
## Q25_1 Q25_2 Q25_3 Q25_4
Q68_First.Click
## Min. :2.00 Min. :2.00 Min. :2.00 Min. :2.00 Min. :
0.000
## 1st Qu.:3.00 1st Qu.:2.75 1st Qu.:4.00 1st Qu.:4.00 1st Qu.:
0.000
## Median :4.50 Median :4.00 Median :5.00 Median :4.50 Median :
0.000
## Mean :4.55 Mean :4.25 Mean :4.80 Mean :4.50 Mean :
3.413
## 3rd Qu.:6.00 3rd Qu.:6.00 3rd Qu.:5.25 3rd Qu.:5.25 3rd Qu.:
3.359
## Max. :7.00 Max. :7.00 Max. :7.00 Max. :7.00
Max. :19.950
## Q68_Last.Click Q68_Page.Submit Q68_Click.Count Q27_1
## Min. : 0.000 Min. : 8.129 Min. : 0.0 Min. :2.00
## 1st Qu.: 0.000 1st Qu.:13.448 1st Qu.: 0.0 1st Qu.:2.75
## Median : 0.000 Median :18.240 Median : 0.0 Median :3.00
## Mean : 9.394 Mean :23.480 Mean : 1.9 Mean :3.05
## 3rd Qu.:11.235 3rd Qu.:25.448 3rd Qu.: 1.0 3rd Qu.:4.00
## Max. :79.827 Max. :94.135 Max. :21.0 Max. :4.00
## Q27_2 Q27_3 Q27_4 Q32
Q33_1
## Min. :2.00 Min. :2.0 Min. :2.0 Length:20
Min. :2.0
## 1st Qu.:2.00 1st Qu.:3.0 1st Qu.:2.0 Class :character 1st
Qu.:3.0
## Median :3.00 Median :4.0 Median :3.0 Mode :character
Median :3.0
## Mean :3.05 Mean :3.7 Mean :3.2
Mean :3.6
## 3rd Qu.:4.00 3rd Qu.:4.0 3rd Qu.:4.0 3rd
Qu.:5.0
## Max. :5.00 Max. :6.0 Max. :6.0
Max. :5.0
## Q34_1 Q34_2 Q34_3 Q34_4 Q34_5
## Min. :1.00 Min. :1.0 Min. :2.00 Min. :1.0 Min. :1.00
## 1st Qu.:1.75 1st Qu.:1.0 1st Qu.:4.00 1st Qu.:2.0 1st Qu.:1.00
## Median :2.50 Median :1.5 Median :5.00 Median :2.5 Median :1.50
## Mean :2.65 Mean :2.3 Mean :4.35 Mean :2.8 Mean :1.90
## 3rd Qu.:4.00 3rd Qu.:4.0 3rd Qu.:5.00 3rd Qu.:4.0 3rd Qu.:2.25
## Max. :5.00 Max. :5.0 Max. :5.00 Max. :5.0 Max. :4.00
## Q63 Q64 Q65
## Length:20 Length:20 Length:20
## Class :character Class :character Class :character

```

```

## Mode :character Mode :character Mode :character
##
##
##
## Progress Duration..in.seconds. Finished
attention_check
## Length:30 Length:30 Length:30 Length:30
## Class :character Class :character Class :character
Class :character
## Mode :character Mode :character Mode :character
Mode :character
##
##
##
## Q67_First.Click Q67_Last.Click Q67_Page.Submit Q67_Click.Count
## Min. : 0.000 Min. : 0.000 Min. : 2.375 Min. : 0.000
## 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.: 17.829 1st Qu.: 0.000
## Median : 0.248 Median : 1.177 Median : 30.375 Median : 0.500
## Mean : 9.605 Mean : 18.547 Mean : 35.171 Mean : 4.067
## 3rd Qu.: 3.376 3rd Qu.: 28.975 3rd Qu.: 46.304 3rd Qu.: 4.000
## Max. :117.417 Max. :118.425 Max. :141.901 Max. :44.000
## Q25_1 Q25_2 Q25_3 Q25_4
Q68_First.Click
## Min. :1.00 Min. :1.000 Min. :1.000 Min. :1.0 Min. :
0.000
## 1st Qu.:1.25 1st Qu.:1.000 1st Qu.:3.000 1st Qu.:2.0 1st Qu.:
0.000
## Median :2.00 Median :2.000 Median :4.000 Median :2.0 Median :
0.000
## Mean :2.60 Mean :2.233 Mean :3.633 Mean :2.5 Mean :
7.127
## 3rd Qu.:3.00 3rd Qu.:2.750 3rd Qu.:4.750 3rd Qu.:3.0 3rd Qu.:
3.857
## Max. :7.00 Max. :6.000 Max. :7.000 Max. :6.0
Max. :131.801
## Q68_Last.Click Q68_Page.Submit Q68_Click.Count Q27_1
## Min. : 0.00 Min. : 1.774 Min. : 0.000 Min. :3.000
## 1st Qu.: 0.00 1st Qu.: 15.528 1st Qu.: 0.000 1st Qu.:4.000
## Median : 0.00 Median : 21.504 Median : 0.000 Median :5.000
## Mean : 10.43 Mean : 28.244 Mean : 2.267 Mean :4.967
## 3rd Qu.: 11.02 3rd Qu.: 35.155 3rd Qu.: 1.750 3rd Qu.:6.000
## Max. :131.80 Max. :140.839 Max. :24.000 Max. :7.000
## Q27_2 Q27_3 Q27_4 Q32
## Min. :2.000 Min. :1.000 Min. :1.000 Length:30
## 1st Qu.:3.250 1st Qu.:4.000 1st Qu.:4.000 Class :character
## Median :5.000 Median :5.000 Median :5.000 Mode :character
## Mean :4.567 Mean :4.633 Mean :4.567
## 3rd Qu.:5.750 3rd Qu.:6.000 3rd Qu.:5.000
## Max. :7.000 Max. :7.000 Max. :7.000
## Q33_1 Q34_1 Q34_2 Q34_3 Q34_4
## Min. :1.0 Min. :1 Min. :1.000 Min. :1.000
Min. :3.000
## 1st Qu.:3.0 1st Qu.:2 1st Qu.:1.000 1st Qu.:2.000 1st

```

```

Qu.:4.000
## Median :4.0   Median :3   Median :2.500   Median :3.000
Median :5.000
## Mean   :3.7   Mean    :3   Mean    :2.367   Mean    :2.833
Mean    :4.433
## 3rd Qu.:4.0   3rd Qu.:4   3rd Qu.:3.000   3rd Qu.:3.750   3rd
Qu.:5.000
## Max.   :5.0   Max.    :5   Max.    :5.000   Max.    :5.000
Max.    :5.000
##      Q34_5          Q63          Q64          Q65
## Min.    :1.000   Length:30   Length:30   Length:30
## 1st Qu.:3.000   Class :character   Class :character   Class :character
## Median :3.000   Mode  :character   Mode  :character   Mode  :character
## Mean   :3.167
## 3rd Qu.:4.000
## Max.   :5.000

##   Progress          Duration..in.seconds.   Finished
attention_check
## Length:25          Length:25          Length:25          Length:25
## Class :character   Class :character   Class :character
Class :character
## Mode  :character   Mode  :character   Mode  :character
Mode  :character
##
##
##
## Q69_First.Click   Q69_Last.Click   Q69_Page.Submit   Q69_Click.Count
## Min.    : 0.000   Min.    : 0.000   Min.    : 20.48   Min.    : 0.0
## 1st Qu.: 0.000   1st Qu.: 0.000   1st Qu.: 28.21   1st Qu.: 0.0
## Median : 1.784   Median : 2.374   Median : 32.95   Median : 1.0
## Mean   : 2.672   Mean    :15.082   Mean    : 45.49   Mean    : 5.8
## 3rd Qu.: 4.386   3rd Qu.:20.534   3rd Qu.: 57.82   3rd Qu.:11.0
## Max.   :13.183   Max.    :82.542   Max.    :152.77   Max.    :24.0
##      Q29_1          Q29_2          Q29_3          Q29_4
Q56_First.Click
## Min.    :2.00   Min.    :2.00   Min.    :1.00   Min.    :1.0   Min.    :
0.000
## 1st Qu.:5.00   1st Qu.:4.00   1st Qu.:4.00   1st Qu.:4.0   1st Qu.:
0.000
## Median :5.00   Median :5.00   Median :5.00   Median :4.0   Median :
2.403
## Mean   :5.36   Mean    :4.68   Mean    :4.44   Mean    :4.4   Mean    :
5.886
## 3rd Qu.:6.00   3rd Qu.:5.00   3rd Qu.:6.00   3rd Qu.:5.0   3rd Qu.:
4.531
## Max.   :7.00   Max.    :7.00   Max.    :7.00   Max.    :7.0
Max.    :40.292
## Q56_Last.Click   Q56_Page.Submit   Q56_Click.Count   Q31_1
Q31_2
## Min.    : 0.000   Min.    : 8.549   Min.    : 0.00   Min.    :1.00
Min.    :1.0
## 1st Qu.: 0.000   1st Qu.:20.531   1st Qu.: 0.00   1st Qu.:2.00   1st
Qu.:2.0

```

```

## Median : 2.403   Median :26.455   Median : 1.00   Median :2.00
Median :3.0
## Mean  :11.975   Mean  :29.907   Mean  : 3.24   Mean  :2.36
Mean  :2.8
## 3rd Qu.:17.575   3rd Qu.:42.375   3rd Qu.: 3.00   3rd Qu.:3.00   3rd
Qu.:4.0
## Max.  :48.188   Max.  :58.601   Max.  :19.00   Max.  :6.00
Max.  :6.0
##      Q31_3      Q31_4      Q32      Q33_1
Q34_1
## Min.  :1.00   Min.  :1.00   Length:25      Min.  :1.00
Min.  :1.00
## 1st Qu.:4.00   1st Qu.:2.00   Class :character   1st Qu.:3.00   1st
Qu.:2.00
## Median :5.00   Median :3.00   Mode  :character   Median :4.00
Median :3.00
## Mean  :4.52   Mean  :3.32      Mean  :3.48
Mean  :2.72
## 3rd Qu.:5.00   3rd Qu.:4.00      3rd Qu.:4.00   3rd
Qu.:4.00
## Max.  :7.00   Max.  :7.00      Max.  :5.00
Max.  :4.00
##      Q34_2      Q34_3      Q34_4      Q34_5      Q63
## Min.  :1.00   Min.  :1.00   Min.  :1.0   Min.  :1.00   Length:25
## 1st Qu.:1.00   1st Qu.:2.00   1st Qu.:4.0   1st Qu.:2.00
Class :character
## Median :2.00   Median :3.00   Median :5.0   Median :3.00
Mode  :character
## Mean  :2.32   Mean  :3.12   Mean  :4.4   Mean  :2.84
## 3rd Qu.:4.00   3rd Qu.:4.00   3rd Qu.:5.0   3rd Qu.:4.00
## Max.  :5.00   Max.  :5.00   Max.  :5.0   Max.  :5.00
##      Q64      Q65
## Length:25      Length:25
## Class :character   Class :character
## Mode  :character   Mode  :character
##
##
##
##      Progress      Duration..in.seconds.      Finished
attention_check
## Length:13      Length:13      Length:13      Length:13
## Class :character   Class :character   Class :character
Class :character
## Mode  :character   Mode  :character   Mode  :character
Mode  :character
##
##
##
## Q69_First.Click   Q69_Last.Click   Q69_Page.Submit   Q69_Click.Count
## Min.  : 0.000   Min.  : 0.000   Min.  : 4.229   Min.  :0
## 1st Qu.: 0.000   1st Qu.: 0.000   1st Qu.: 17.548   1st Qu.:0
## Median : 3.111   Median : 3.167   Median : 27.221   Median :1
## Mean  : 6.531   Mean  :12.504   Mean  : 30.946   Mean  :2

```

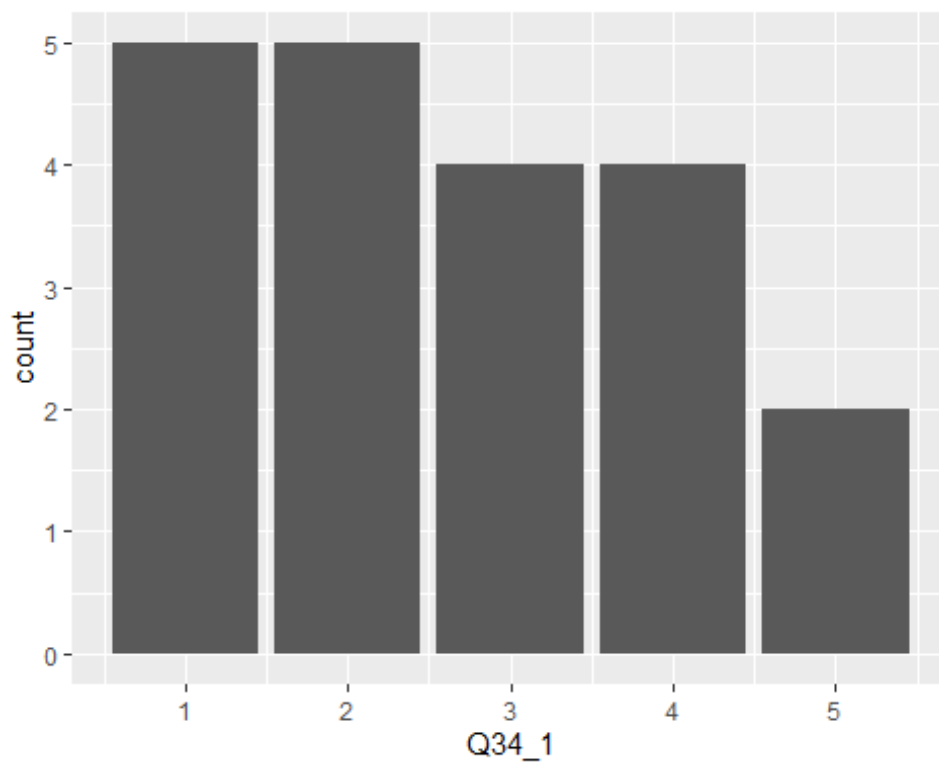
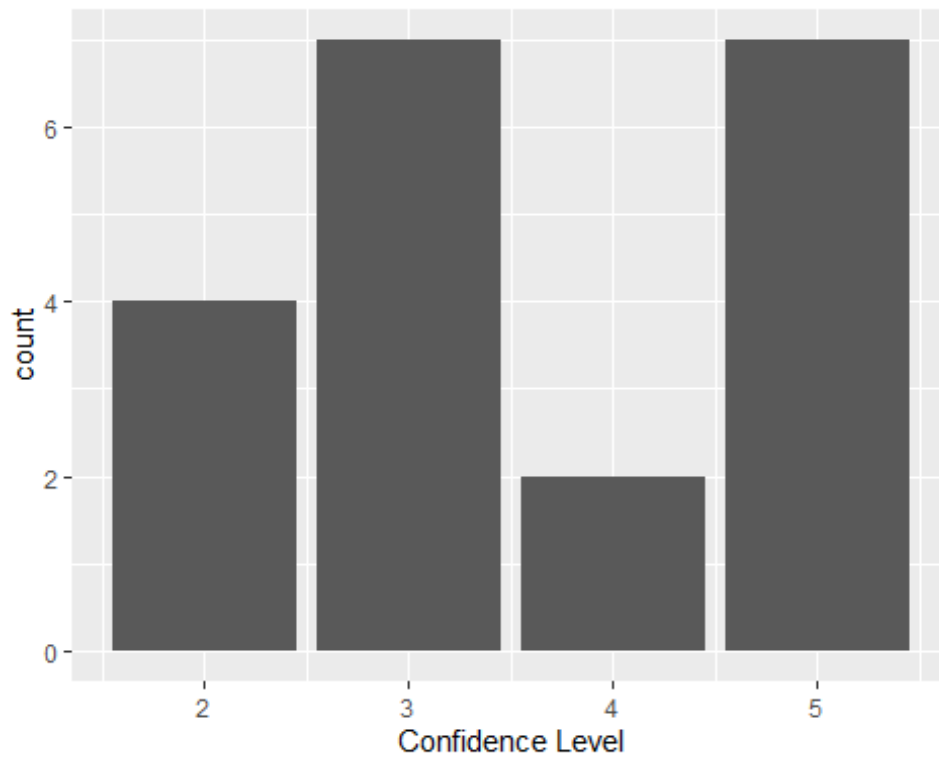
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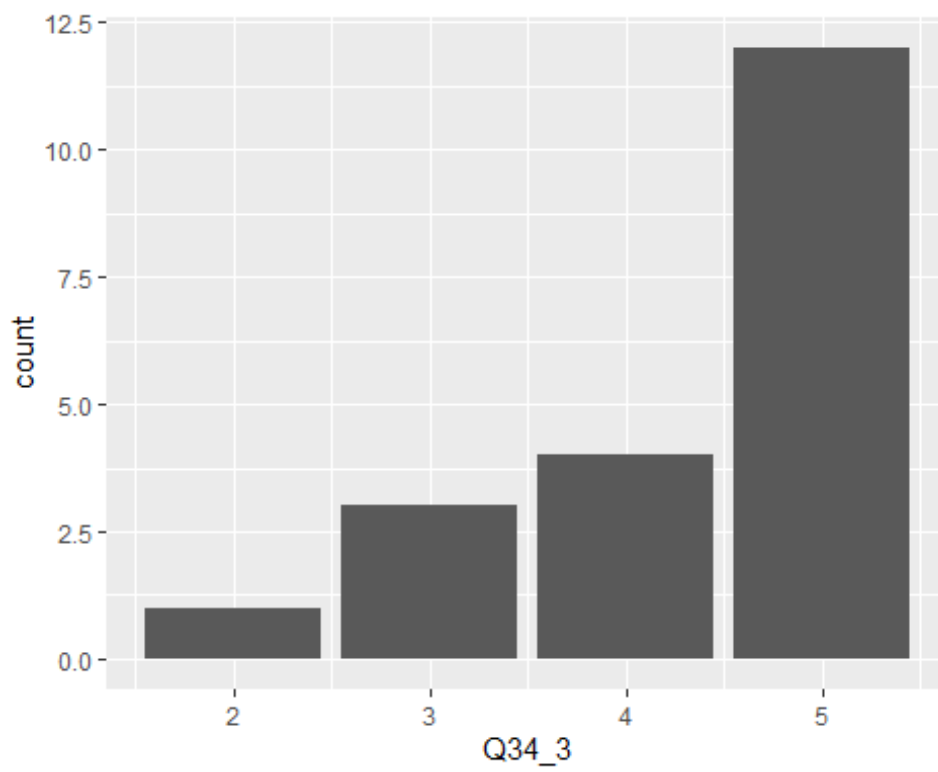
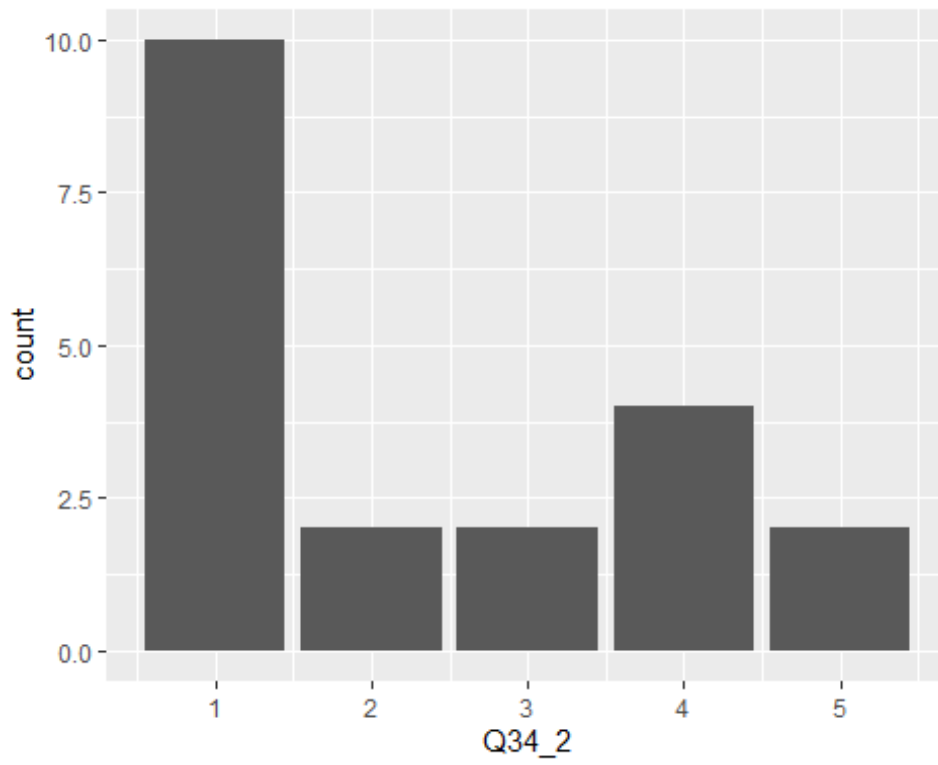
## 3rd Qu.: 7.948 3rd Qu.:22.165 3rd Qu.: 30.496 3rd Qu.:2
## Max. :26.747 Max. :54.394 Max. :104.980 Max. :9
## Q29_1 Q29_2 Q29_3 Q29_4
Q56_First.Click
## Min. :2.000 Min. :2.000 Min. :2.000 Min. :2 Min. :
0.000
## 1st Qu.:3.000 1st Qu.:2.000 1st Qu.:2.000 1st Qu.:2 1st Qu.:
0.000
## Median :3.000 Median :3.000 Median :3.000 Median :3 Median :
0.977
## Mean :3.692 Mean :2.923 Mean :3.308 Mean :3 Mean :
5.713
## 3rd Qu.:4.000 3rd Qu.:4.000 3rd Qu.:4.000 3rd Qu.:4 3rd Qu.:
6.747
## Max. :6.000 Max. :4.000 Max. :6.000 Max. :5
Max. :29.072
## Q56_Last.Click Q56_Page.Submit Q56_Click.Count Q31_1
Q31_2
## Min. : 0.000 Min. : 1.332 Min. :0.000 Min. :3
Min. :3.000
## 1st Qu.: 0.000 1st Qu.:16.246 1st Qu.:0.000 1st Qu.:4 1st
Qu.:5.000
## Median : 0.977 Median :25.332 Median :1.000 Median :6
Median :5.000
## Mean :13.999 Mean :27.515 Mean :1.692 Mean :5
Mean :5.385
## 3rd Qu.:14.944 3rd Qu.:30.275 3rd Qu.:1.000 3rd Qu.:6 3rd
Qu.:7.000
## Max. :75.856 Max. :75.877 Max. :8.000 Max. :7
Max. :7.000
## Q31_3 Q31_4 Q32 Q33_1
Q34_1
## Min. :2.000 Min. :2 Length:13 Min. :3.000
Min. :2
## 1st Qu.:5.000 1st Qu.:5 Class :character 1st Qu.:4.000 1st
Qu.:2
## Median :5.000 Median :5 Mode :character Median :4.000
Median :3
## Mean :5.231 Mean :5 Mean :4.154
Mean :3
## 3rd Qu.:6.000 3rd Qu.:6 3rd Qu.:5.000 3rd
Qu.:4
## Max. :7.000 Max. :7 Max. :5.000
Max. :5
## Q34_2 Q34_3 Q34_4 Q34_5
## Min. :1.000 Min. :1.000 Min. :1.000 Min. :1.000
## 1st Qu.:1.000 1st Qu.:4.000 1st Qu.:2.000 1st Qu.:1.000
## Median :2.000 Median :5.000 Median :2.000 Median :3.000
## Mean :2.231 Mean :4.385 Mean :2.538 Mean :2.692
## 3rd Qu.:4.000 3rd Qu.:5.000 3rd Qu.:3.000 3rd Qu.:4.000
## Max. :5.000 Max. :5.000 Max. :4.000 Max. :5.000
## Q63 Q64 Q65
## Length:13 Length:13 Length:13
## Class :character Class :character Class :character

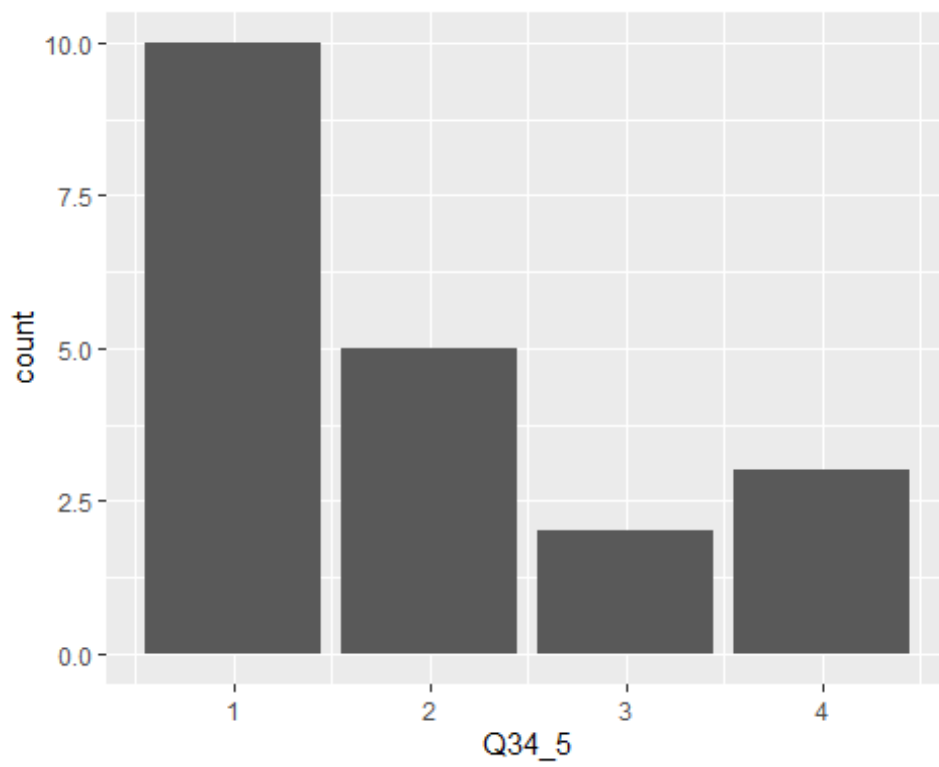
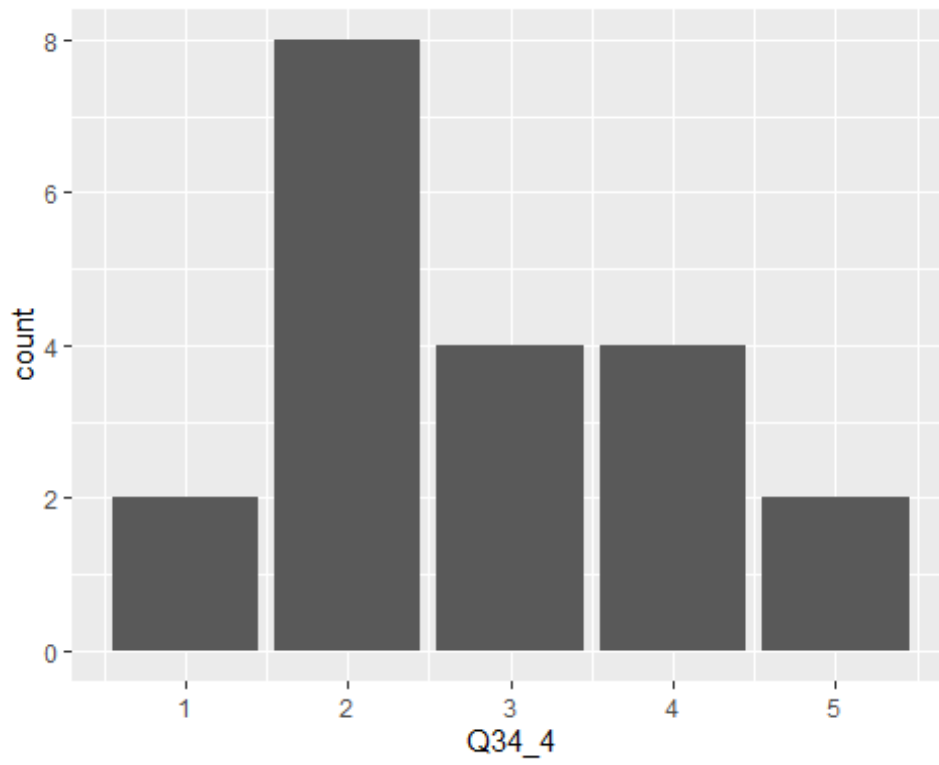
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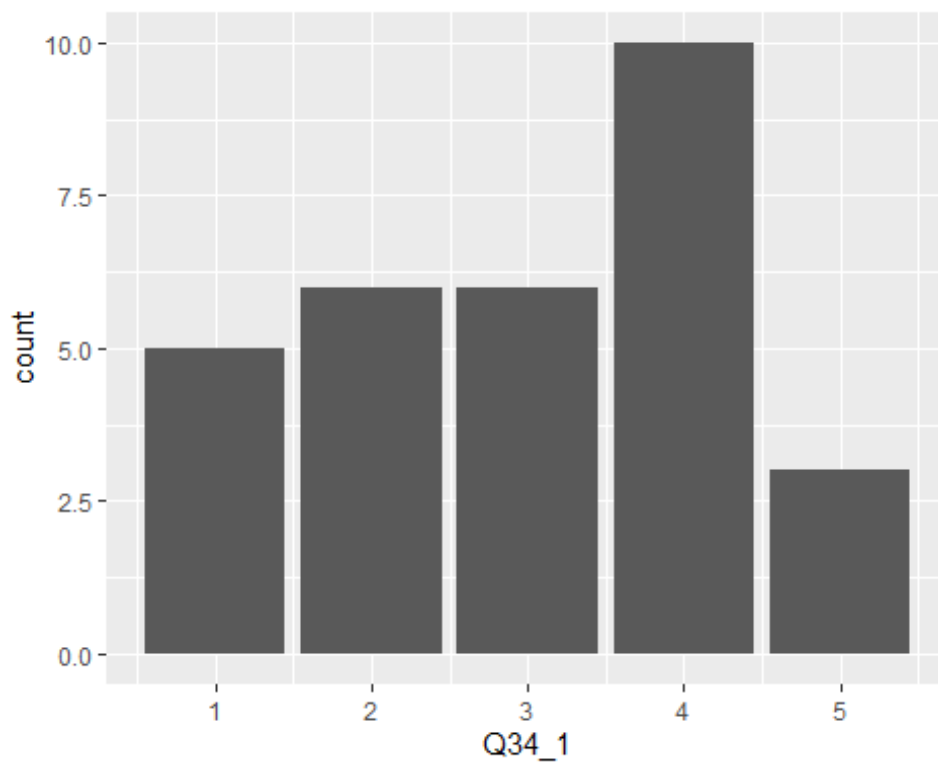
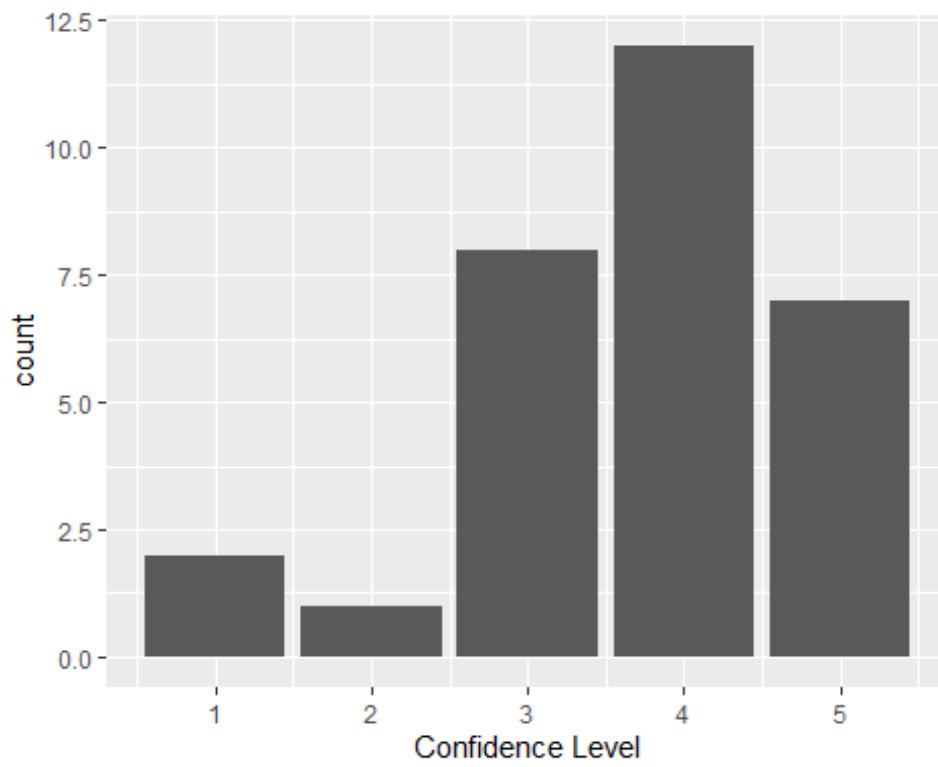


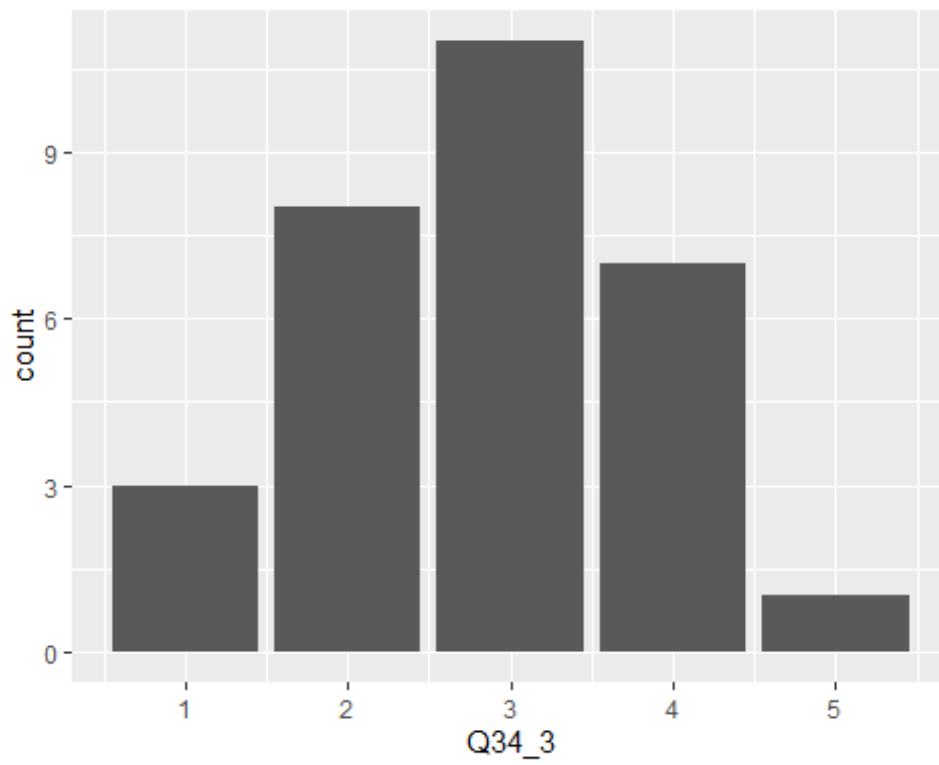
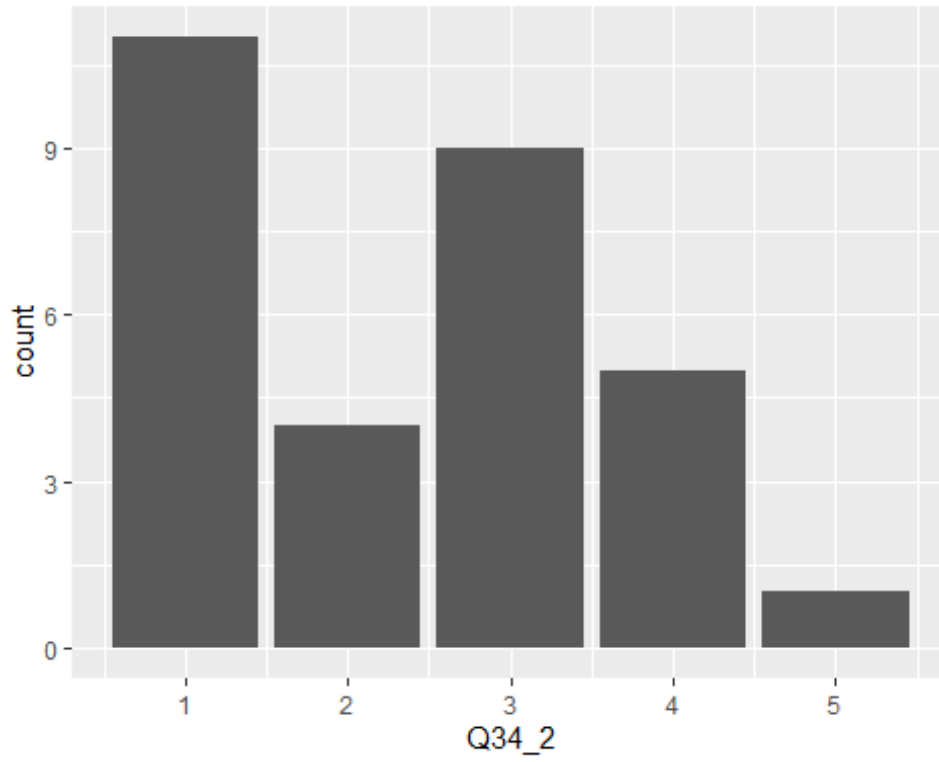
```
## Mode :character Mode :character Mode :character  
##  
##  
##
```

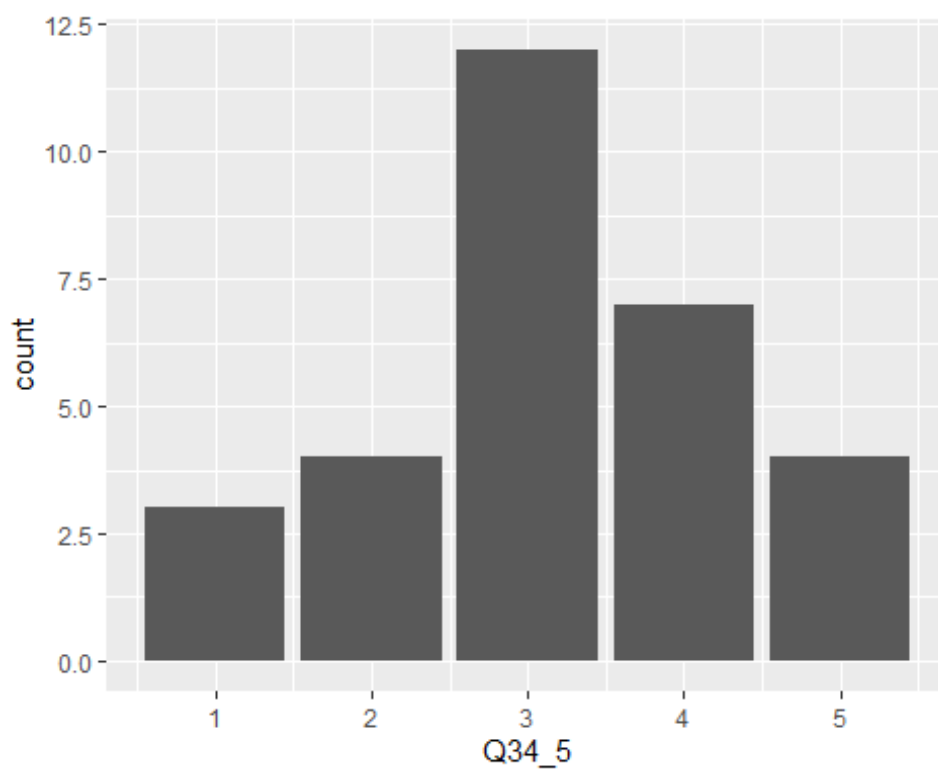
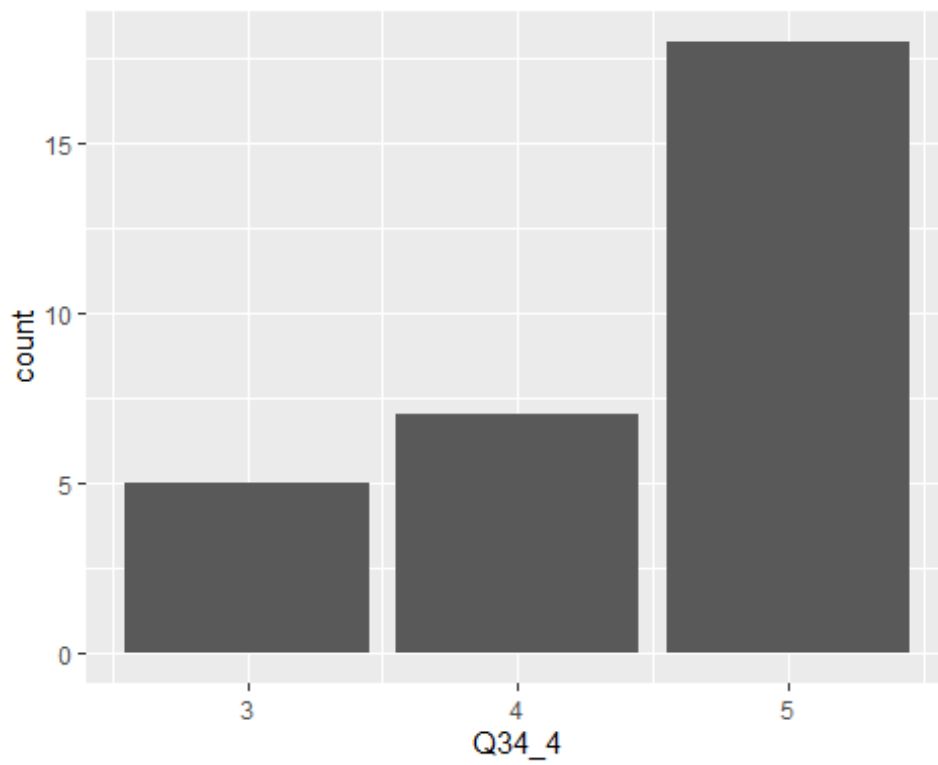


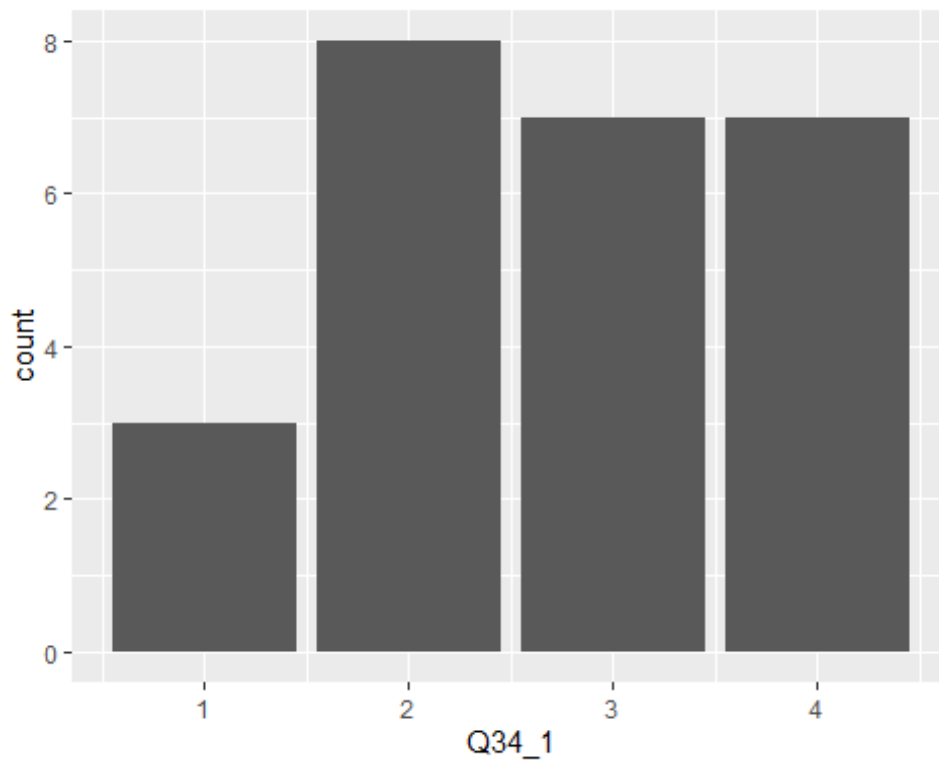
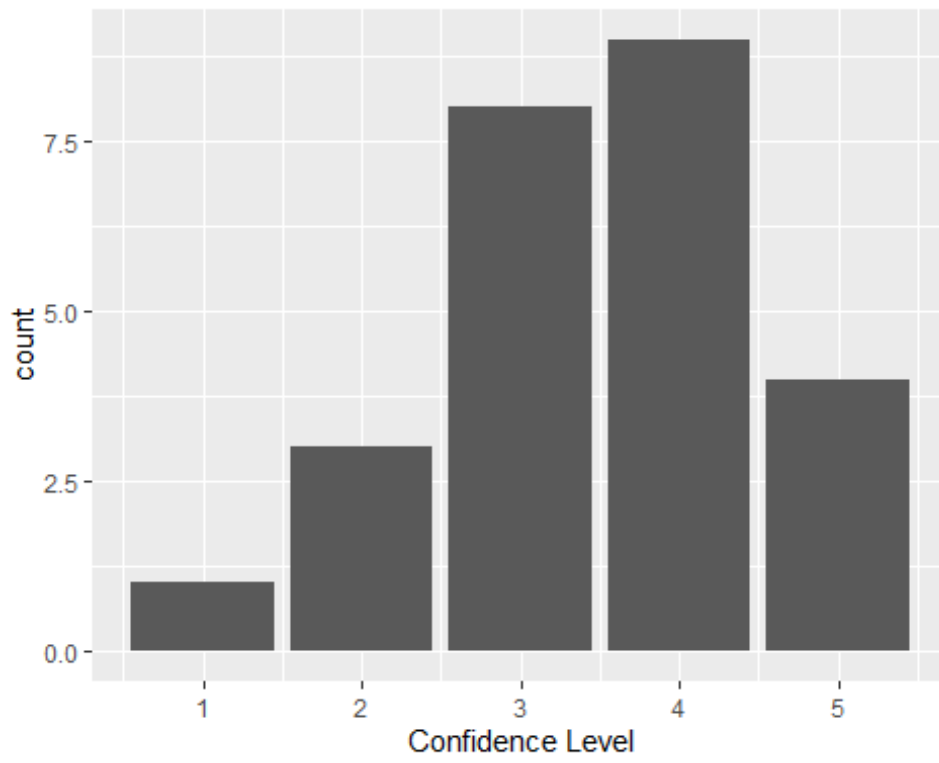


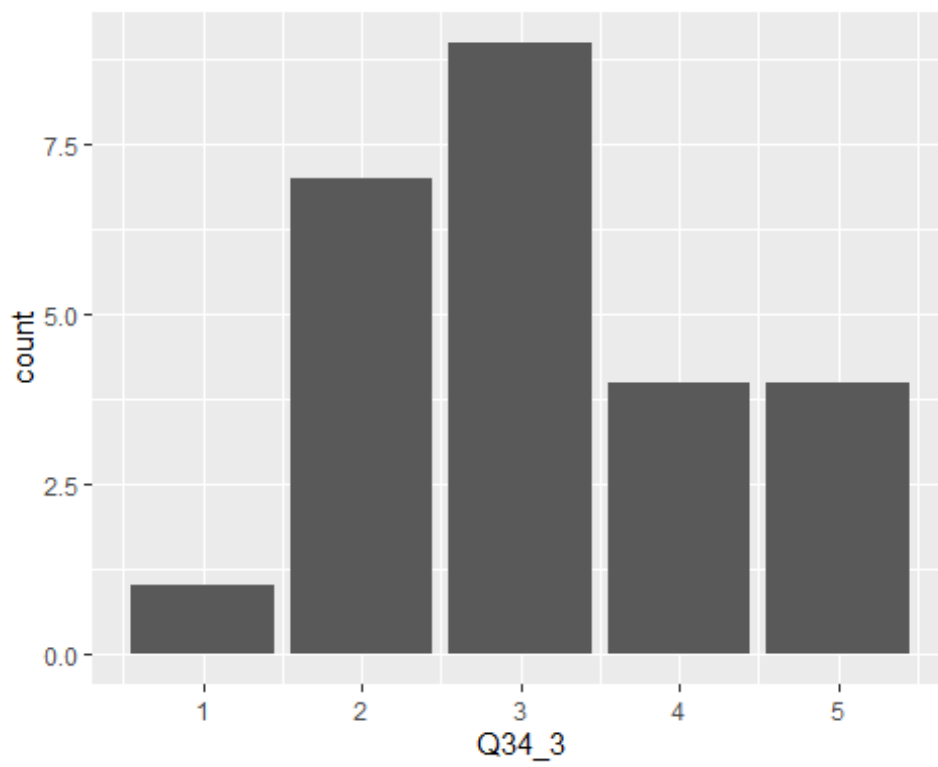
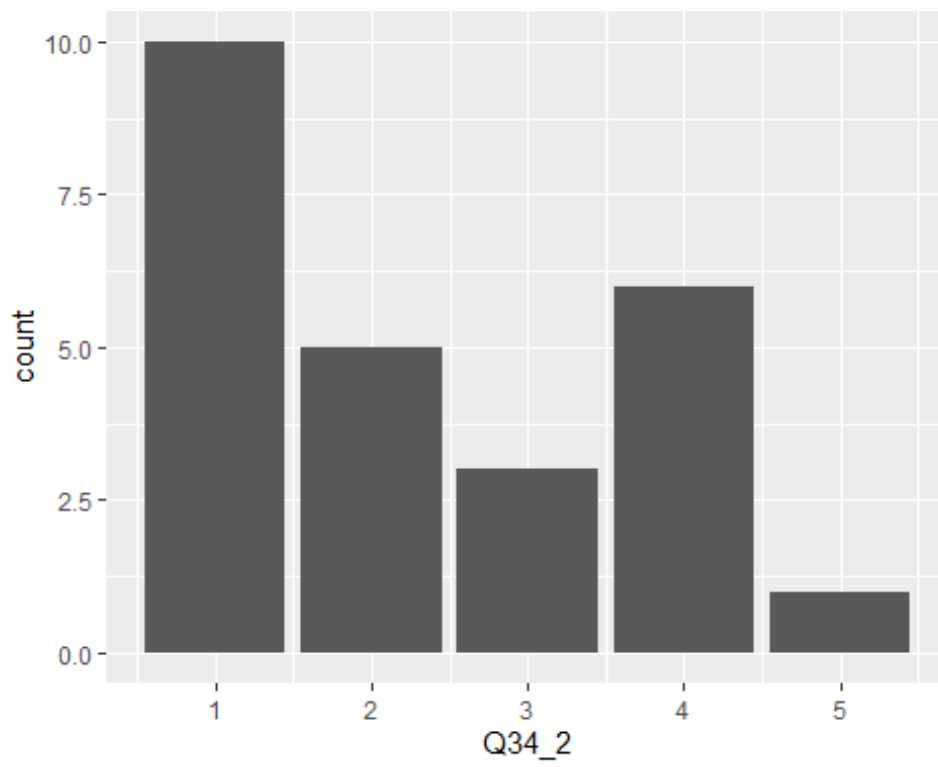




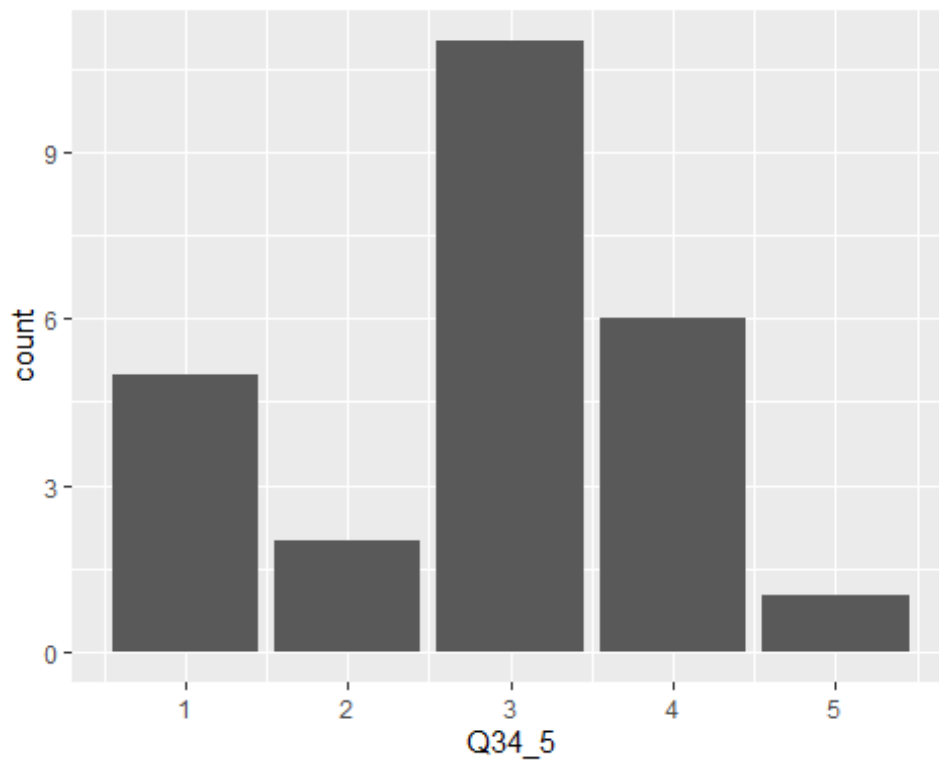
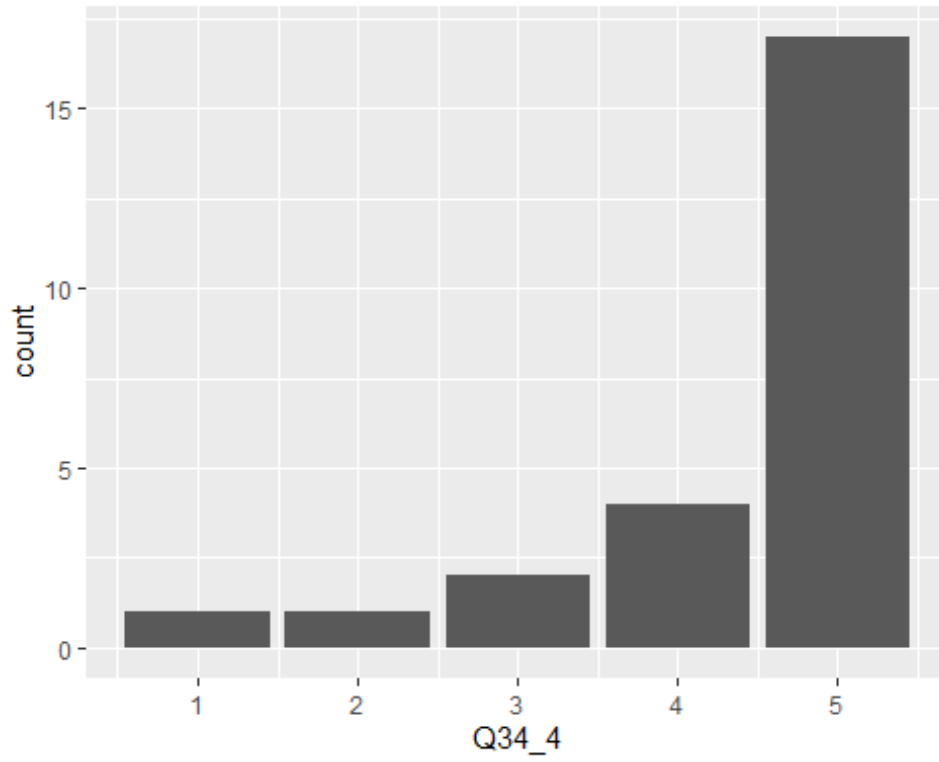


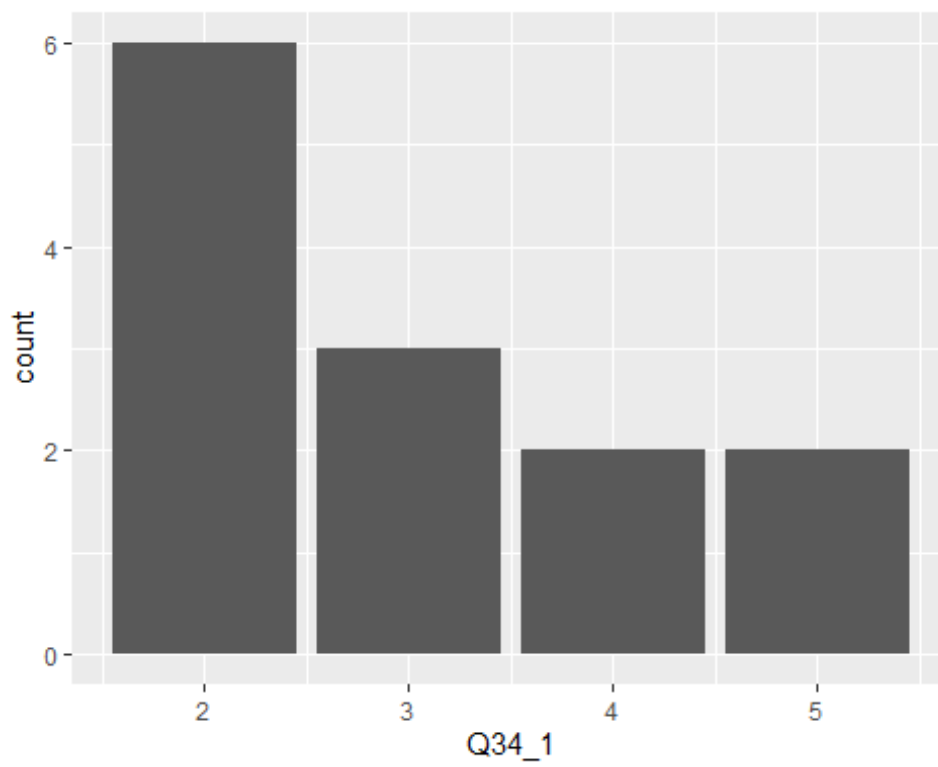
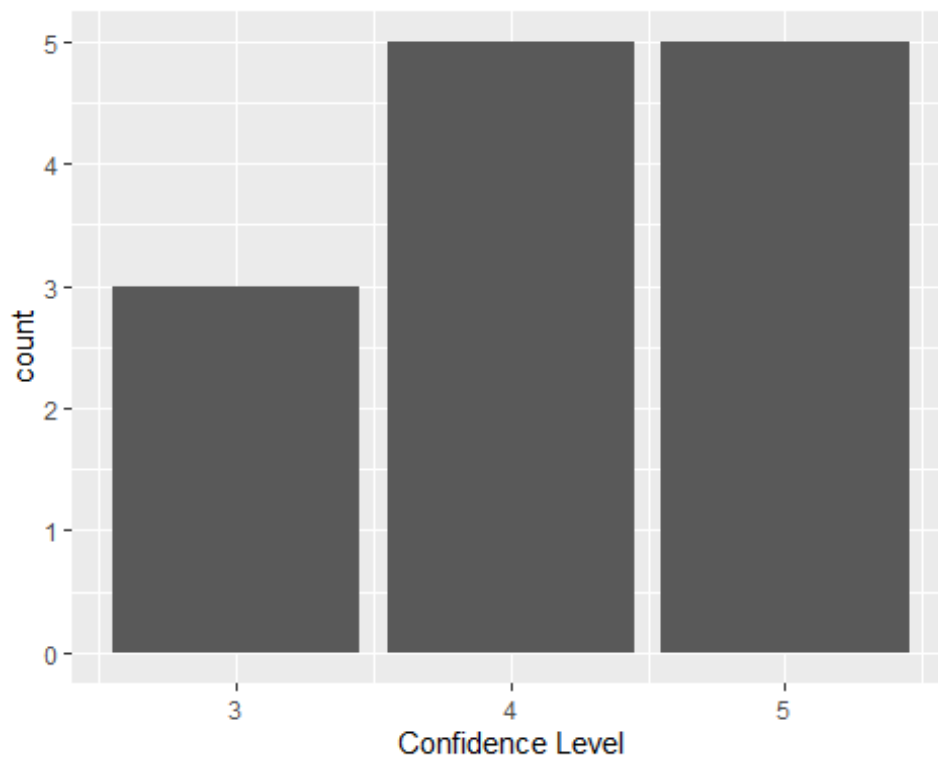


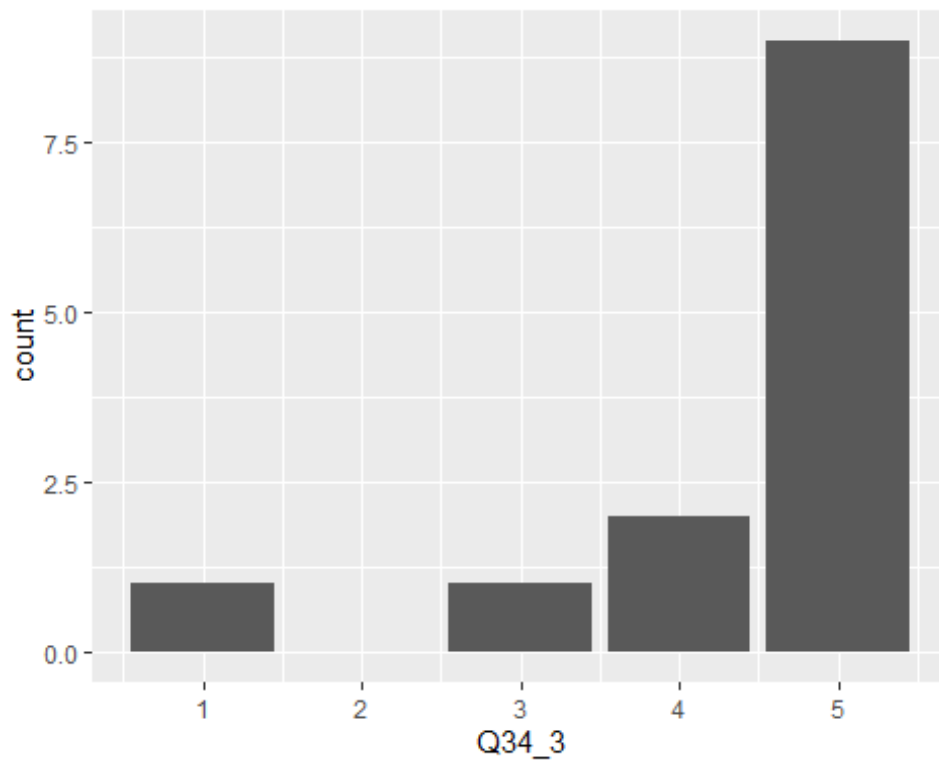
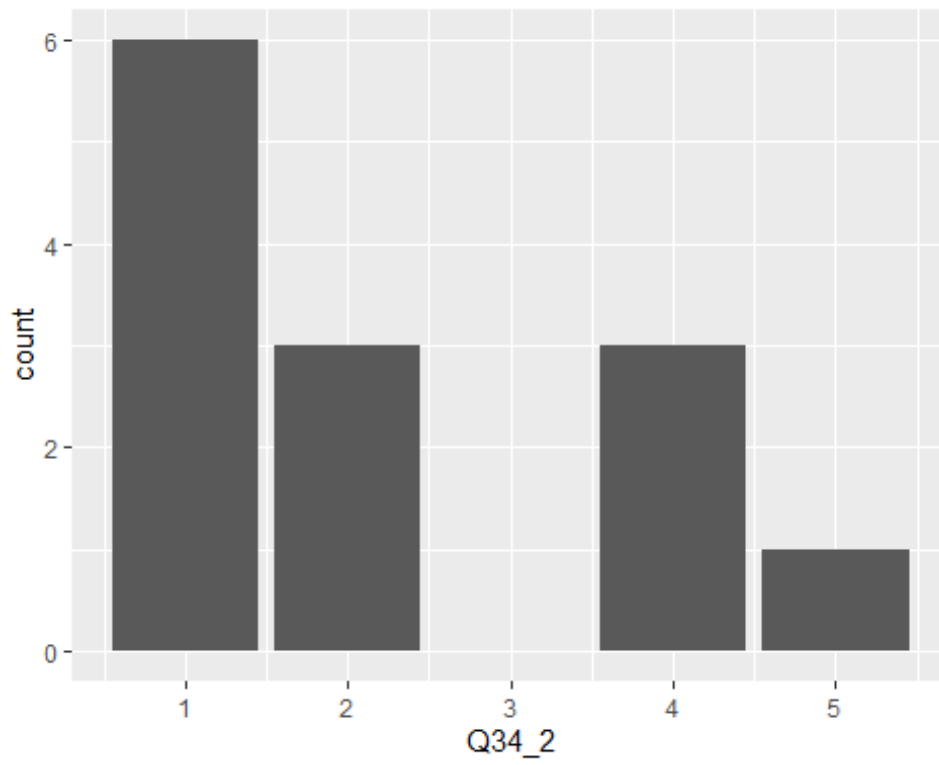


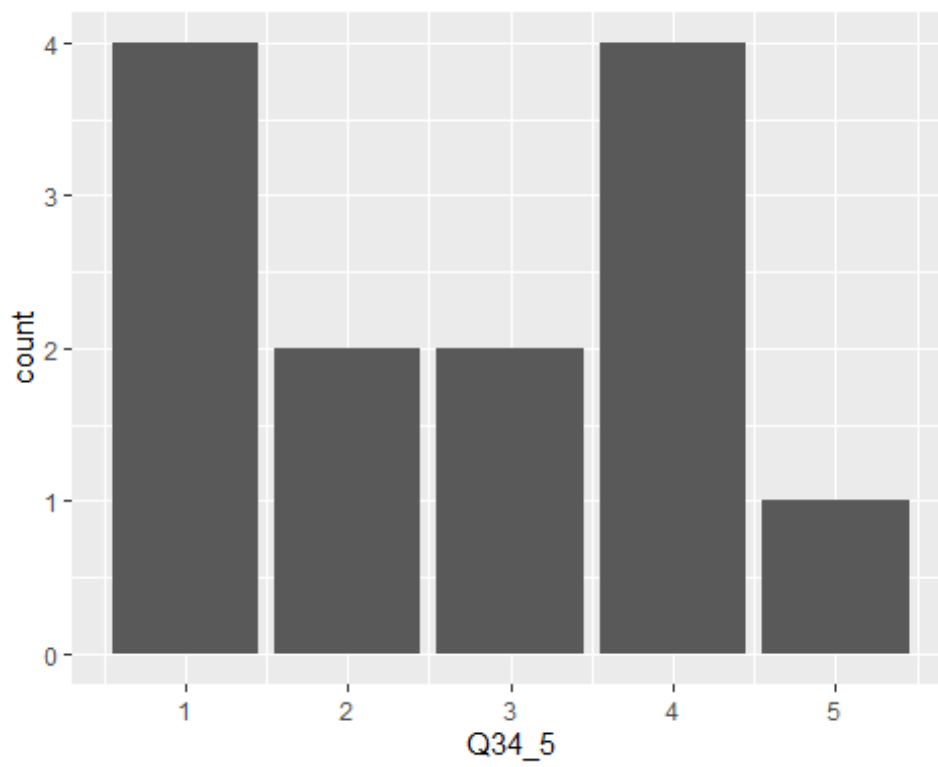
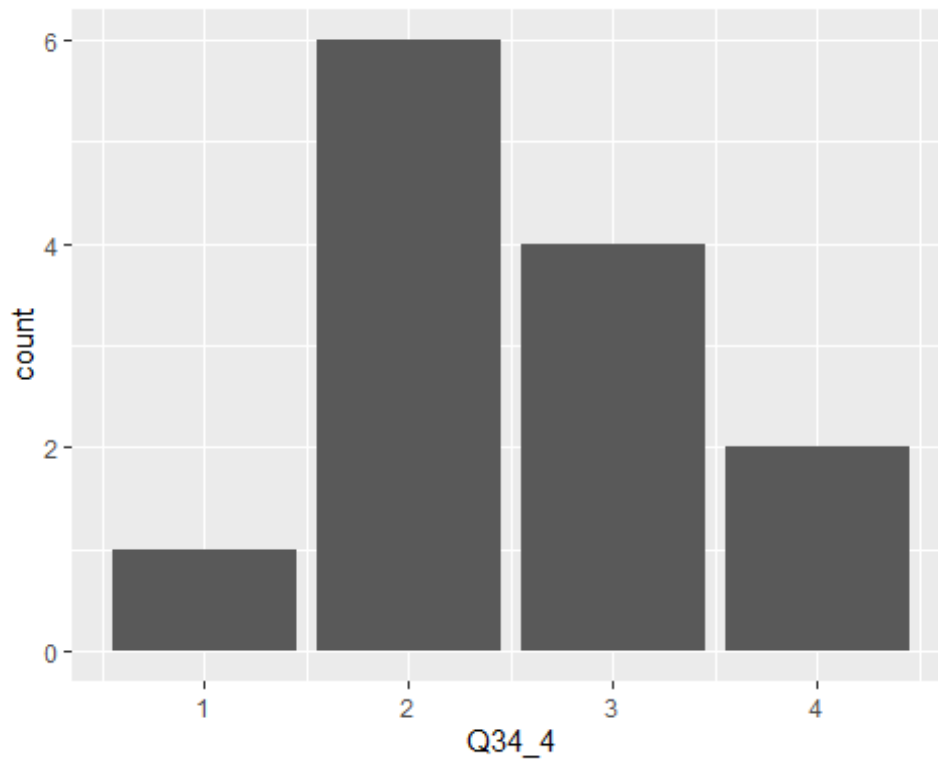












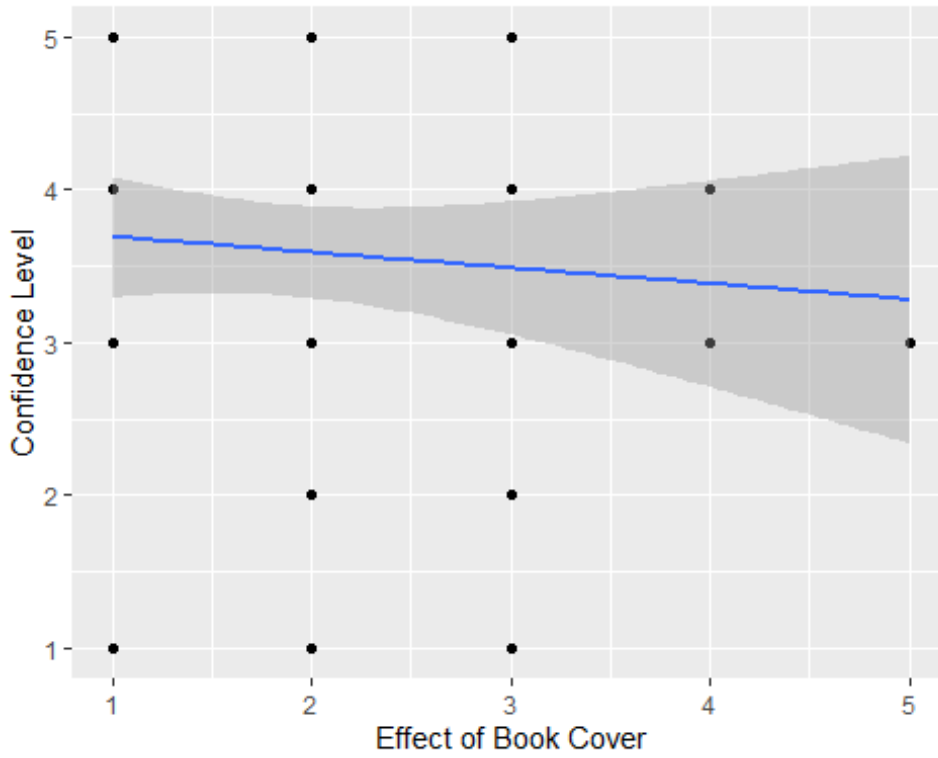
---

## Appendix C: Simple Regression Model for Confidence and Other Variables

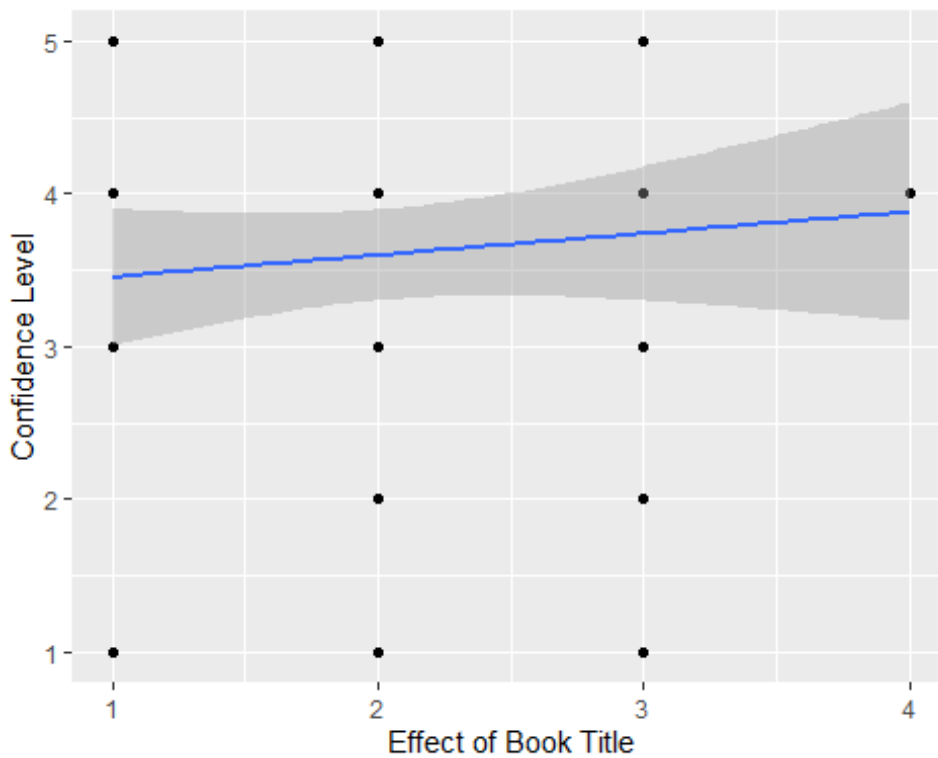
Simple linear regression model to understand the relationship with confidence level and elements in the website page.

Goodreads participants that chosen the book with low rating and positive reviews

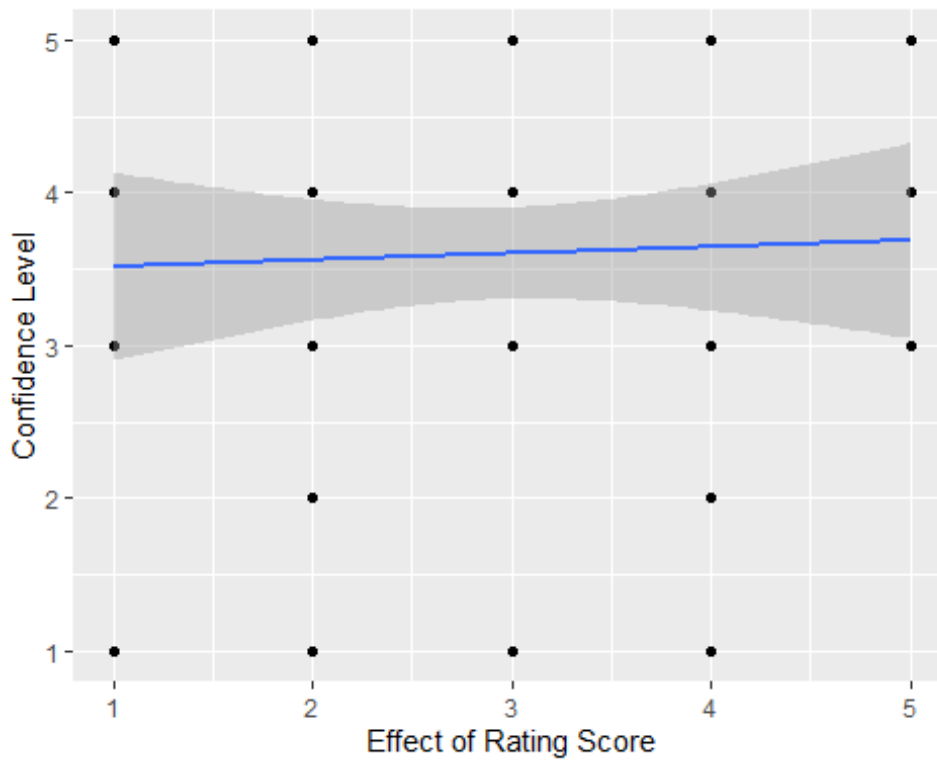
```
##
## Call:
## lm(formula = Q21_1 ~ Q23_1 + Q23_2 + Q23_3 + Q23_4, data = GR_Low)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.6742 -0.5756  0.1295  0.4878  1.3385
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.08389    0.85292  -0.098  0.92204
## Q23_1        -0.38407    0.17268  -2.224  0.03068 *
## Q23_2         0.56762    0.20031   2.834  0.00662 **
## Q23_3        -0.01271    0.11550  -0.110  0.91279
## Q23_4         0.72508    0.15536   4.667 2.32e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9122 on 50 degrees of freedom
## Multiple R-squared:  0.3619, Adjusted R-squared:  0.3108
## F-statistic: 7.088 on 4 and 50 DF,  p-value: 0.0001333
## `geom_smooth()` using formula 'y ~ x'
```



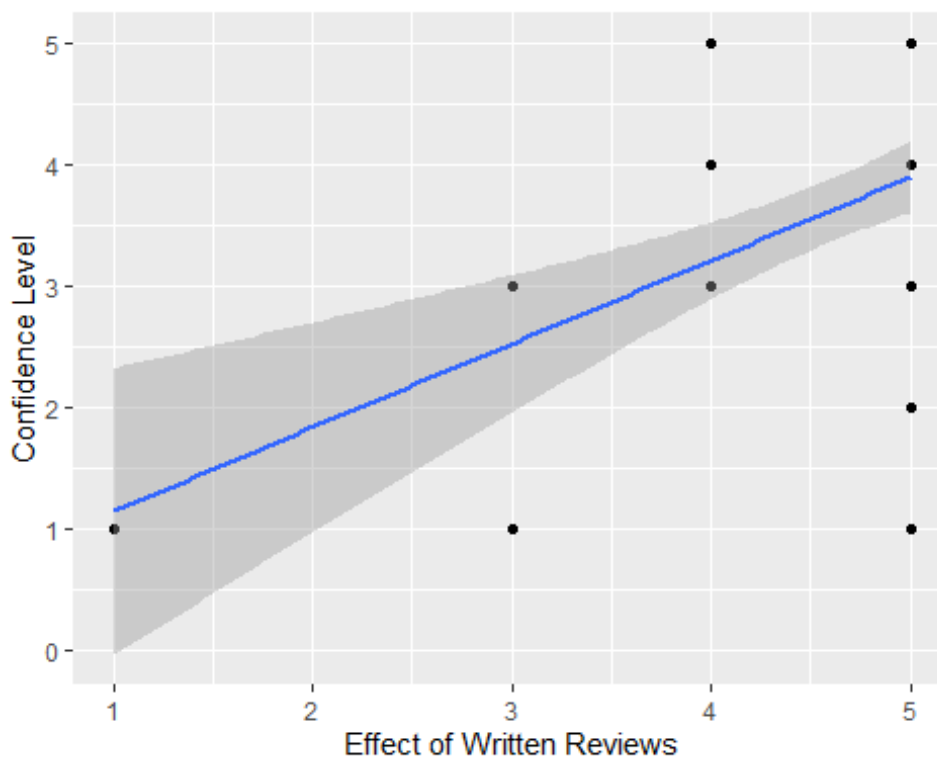
```
## `geom_smooth()` using formula 'y ~ x'
```



```
## `geom_smooth()` using formula 'y ~ x'
```



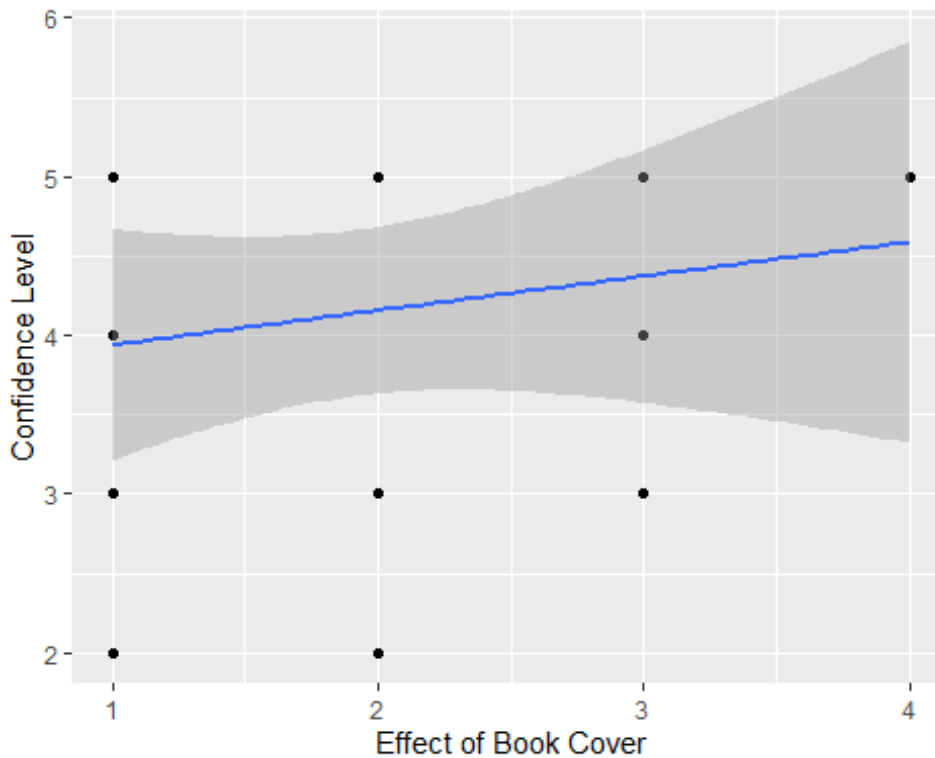
```
## `geom_smooth()` using formula 'y ~ x'
```



Goodreads participants that chosen the book with high rating and negative reviews

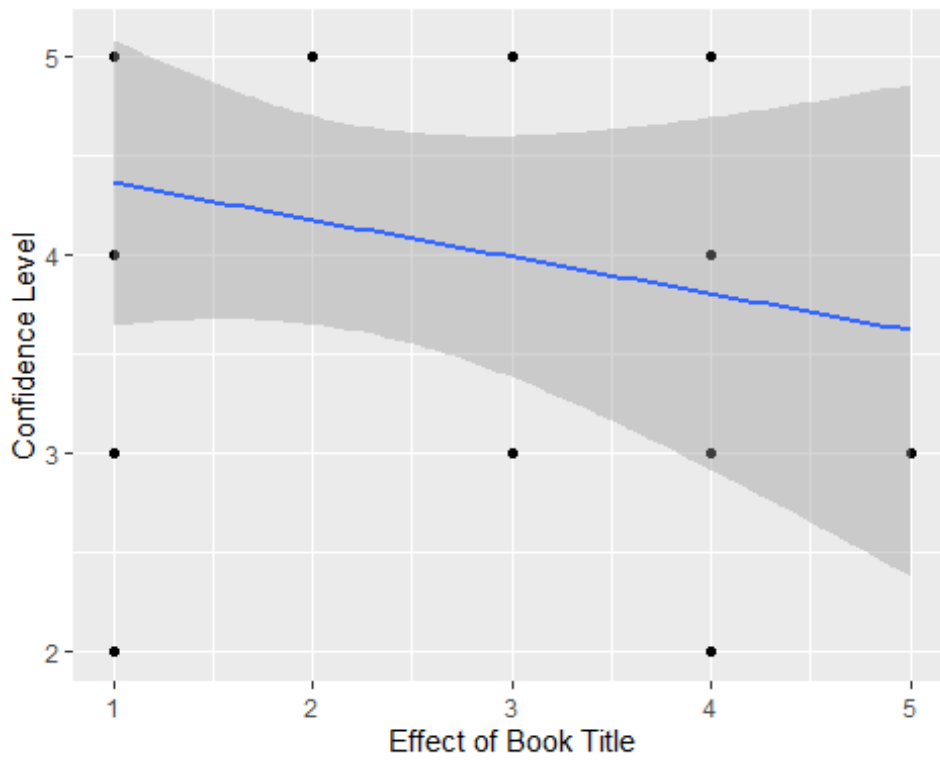
```
##
## Call:
## lm(formula = Q21_1 ~ Q23_1 + Q23_2 + Q23_3 + Q23_4, data = GR_High)
##
```

```
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.5724 -0.4093  0.1767  0.4012  1.4521
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -5.18277    2.25384  -2.300 0.034419 *
## Q23_1         0.01437    0.23795   0.060 0.952555
## Q23_2         0.26531    0.18825   1.409 0.176759
## Q23_3         1.81843    0.41413   4.391 0.000399 ***
## Q23_4         0.17730    0.26514   0.669 0.512672
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8295 on 17 degrees of freedom
## Multiple R-squared:  0.5908, Adjusted R-squared:  0.4946
## F-statistic: 6.137 on 4 and 17 DF,  p-value: 0.003026
## `geom_smooth()` using formula 'y ~ x'
```

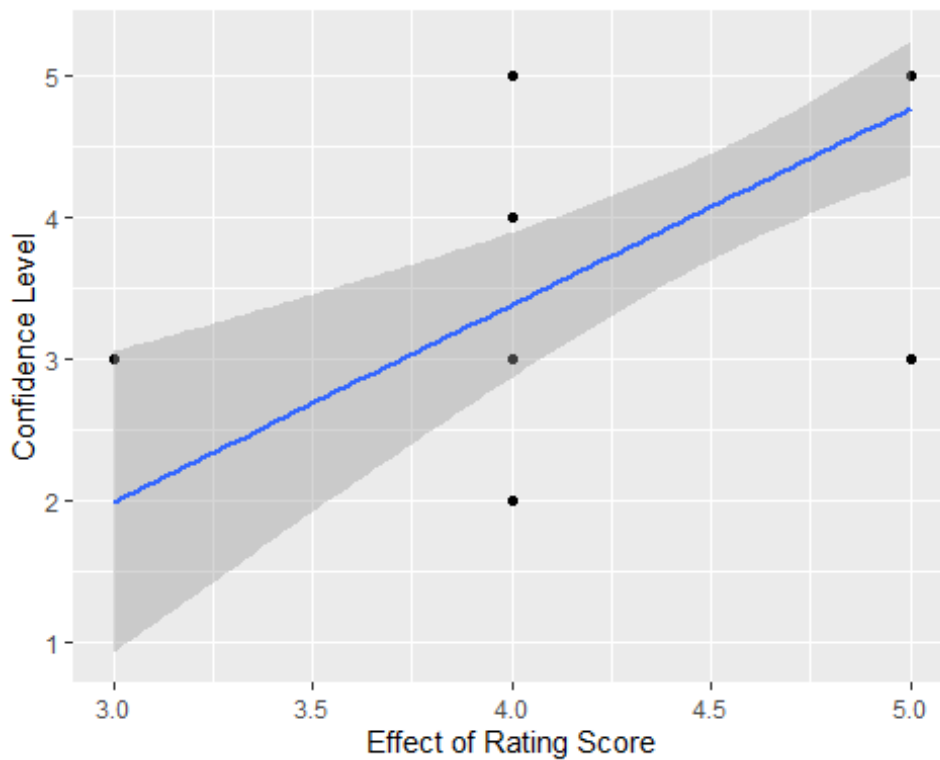


```
## `geom_smooth()` using formula 'y ~ x'
```

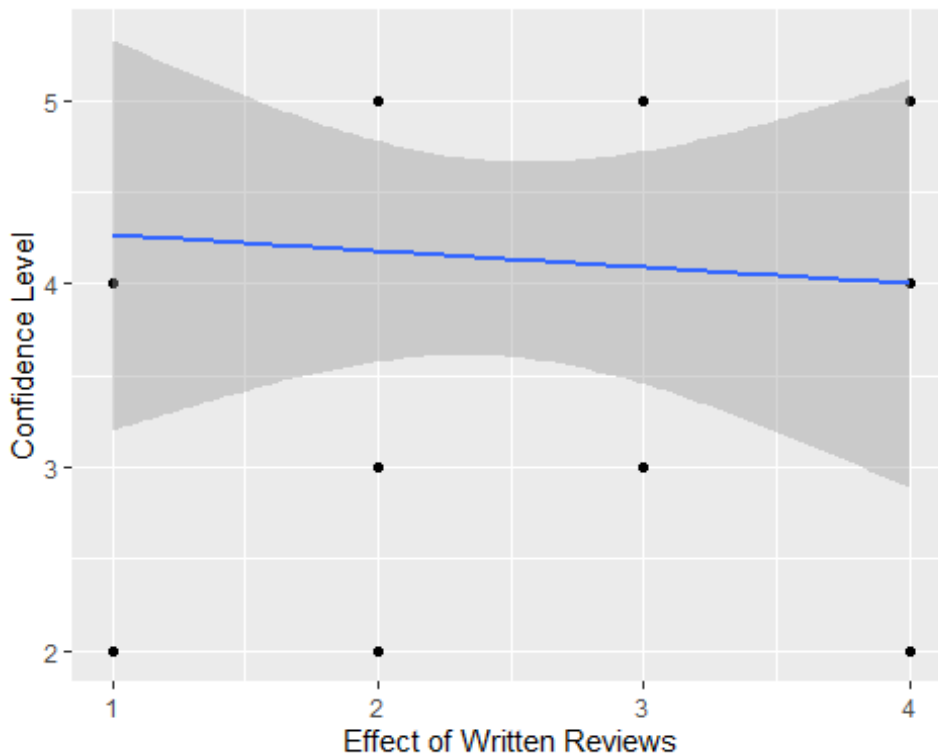




```
## `geom_smooth()` using formula 'y ~ x'
```

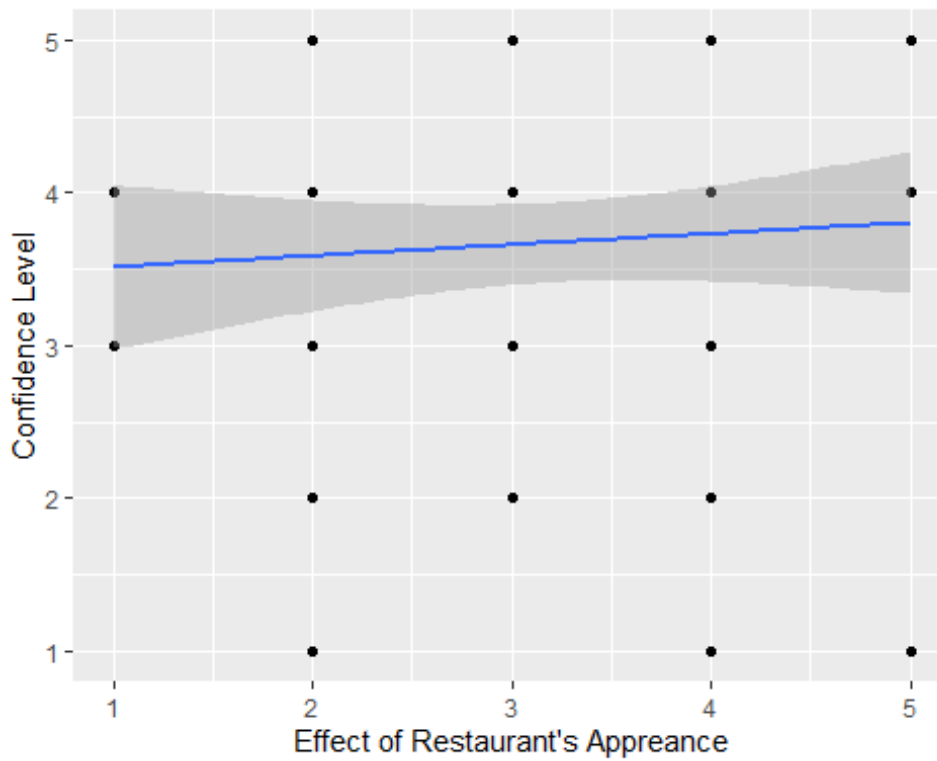


```
## `geom_smooth()` using formula 'y ~ x'
```

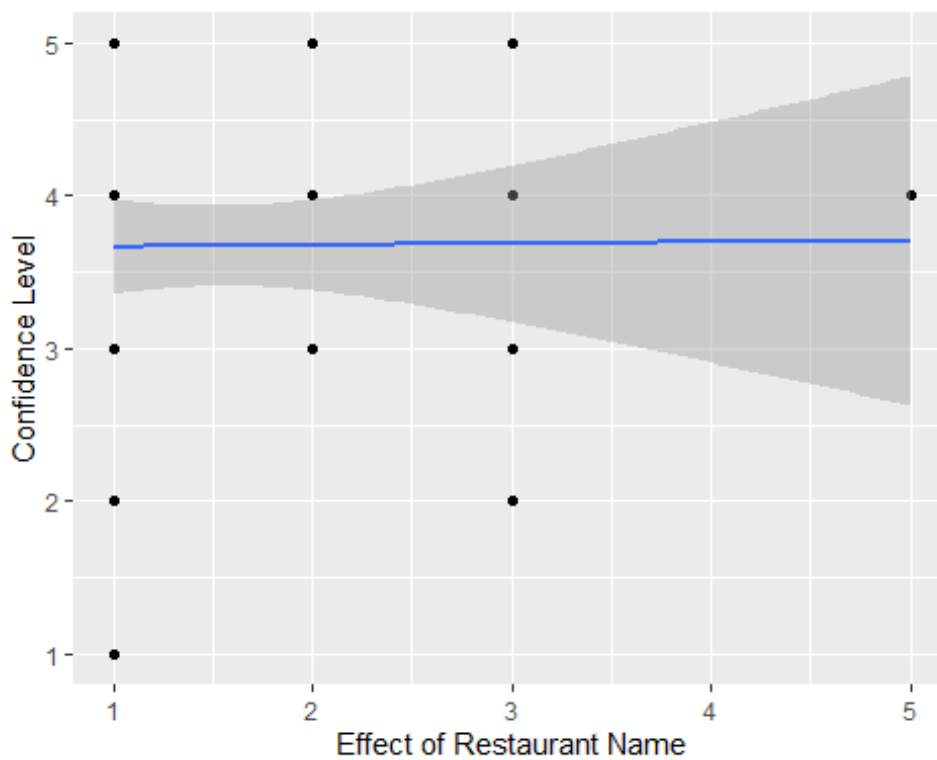


TripAdvisor participants that chosen the book with low rating and positive reviews

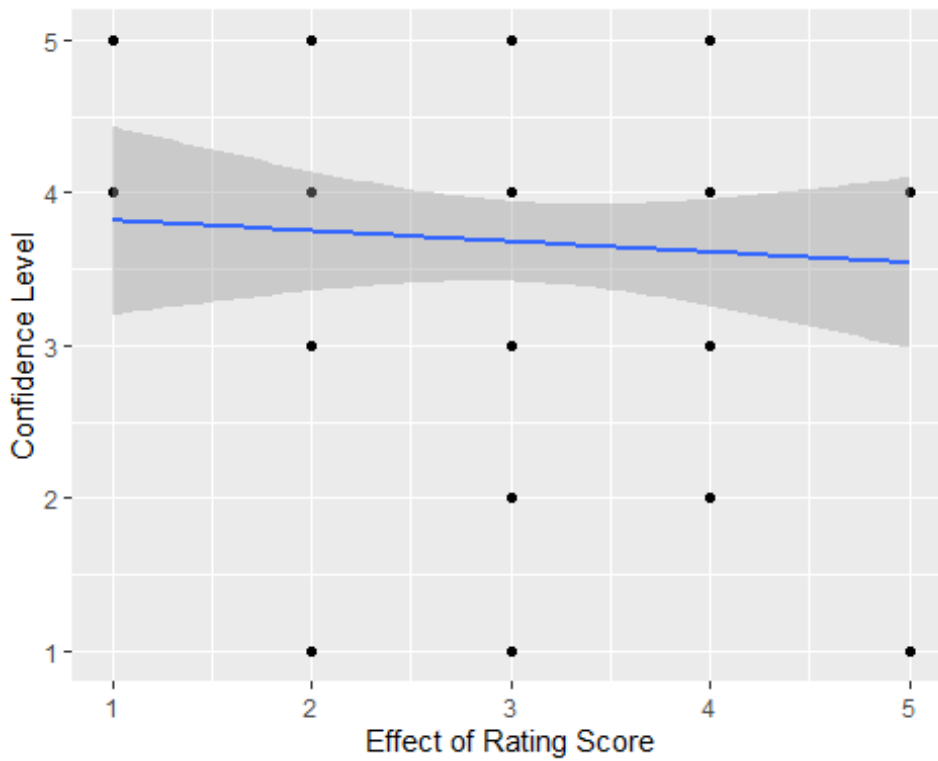
```
##
## Call:
## lm(formula = Q10_1 ~ Q11_1 + Q11_2 + Q11_3 + Q11_4, data = TA_Low)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.7431 -0.4733  0.2331  0.5396  1.9266
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.90454    1.32388   1.439   0.156
## Q11_1         0.09239    0.10885   0.849   0.399
## Q11_2         0.02578    0.15380   0.168   0.867
## Q11_3        -0.05812    0.13354  -0.435   0.665
## Q11_4         0.34676    0.23620   1.468   0.147
##
## Residual standard error: 1.048 on 59 degrees of freedom
## Multiple R-squared:  0.04785,    Adjusted R-squared:  -0.0167
## F-statistic: 0.7413 on 4 and 59 DF,  p-value: 0.5677
## `geom_smooth()` using formula 'y ~ x'
```



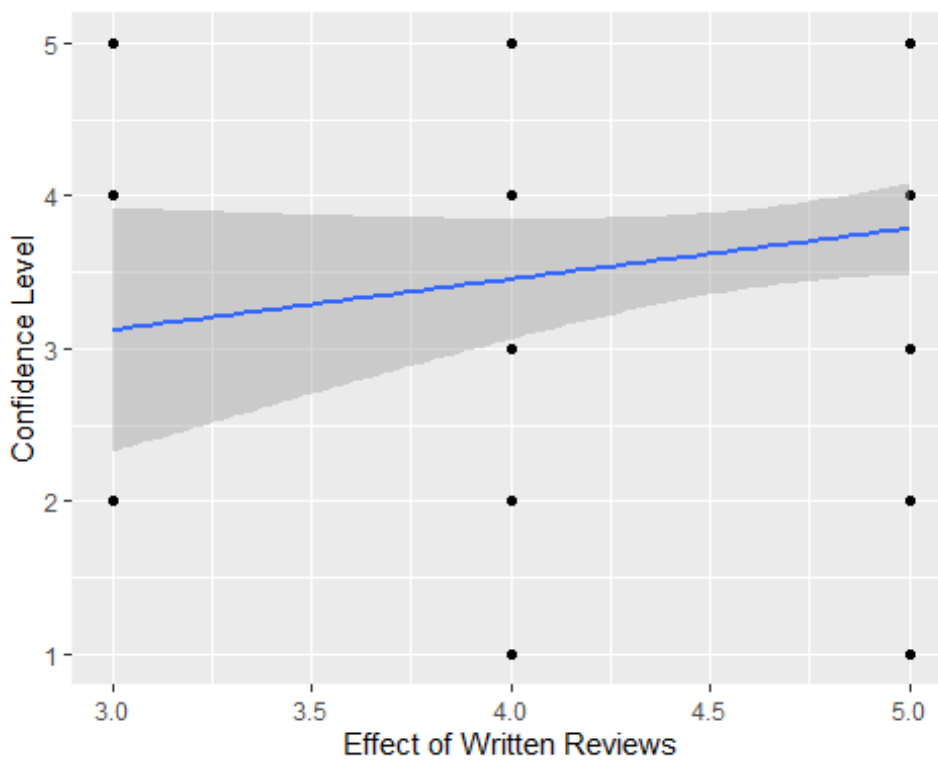
```
## `geom_smooth()` using formula 'y ~ x'
```



```
## `geom_smooth()` using formula 'y ~ x'
```



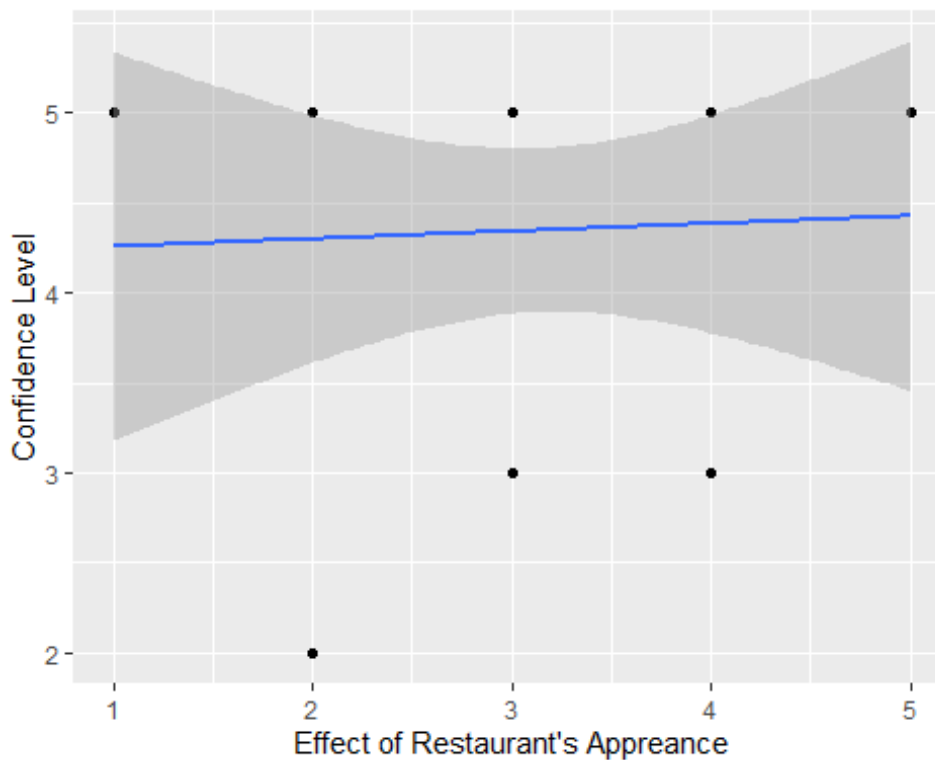
```
## `geom_smooth()` using formula 'y ~ x'
```



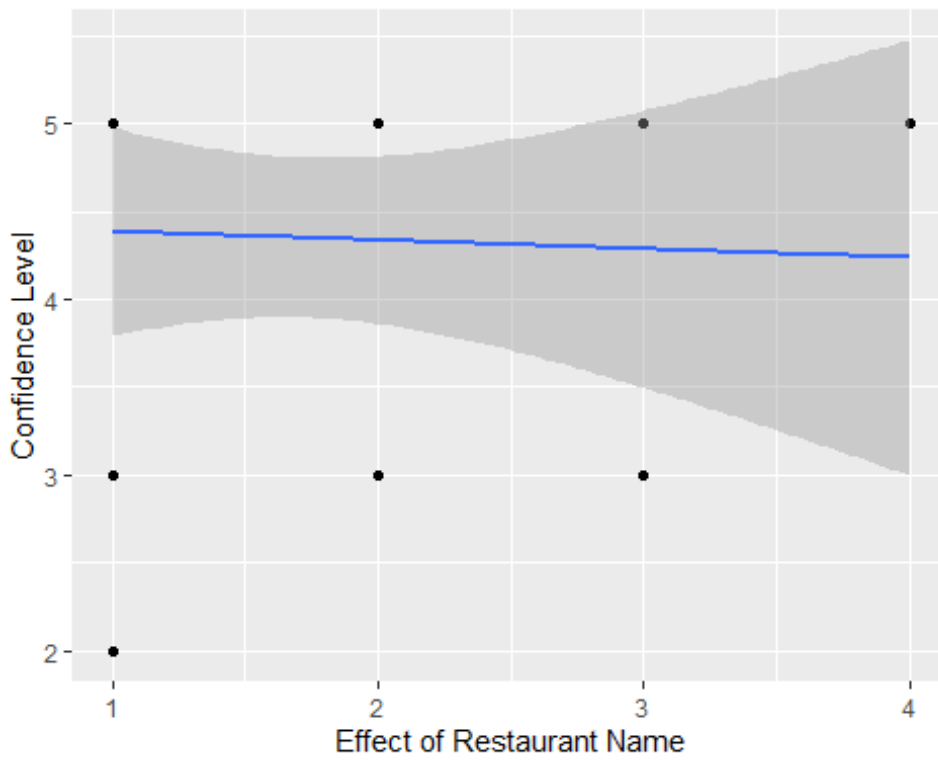
TripAdvisor participants that chosen the book with high rating and negative reviews

```
##
## Call:
## lm(formula = Q10_1 ~ Q11_1 + Q11_2 + Q11_3 + Q11_4, data = TA_High)
##
```

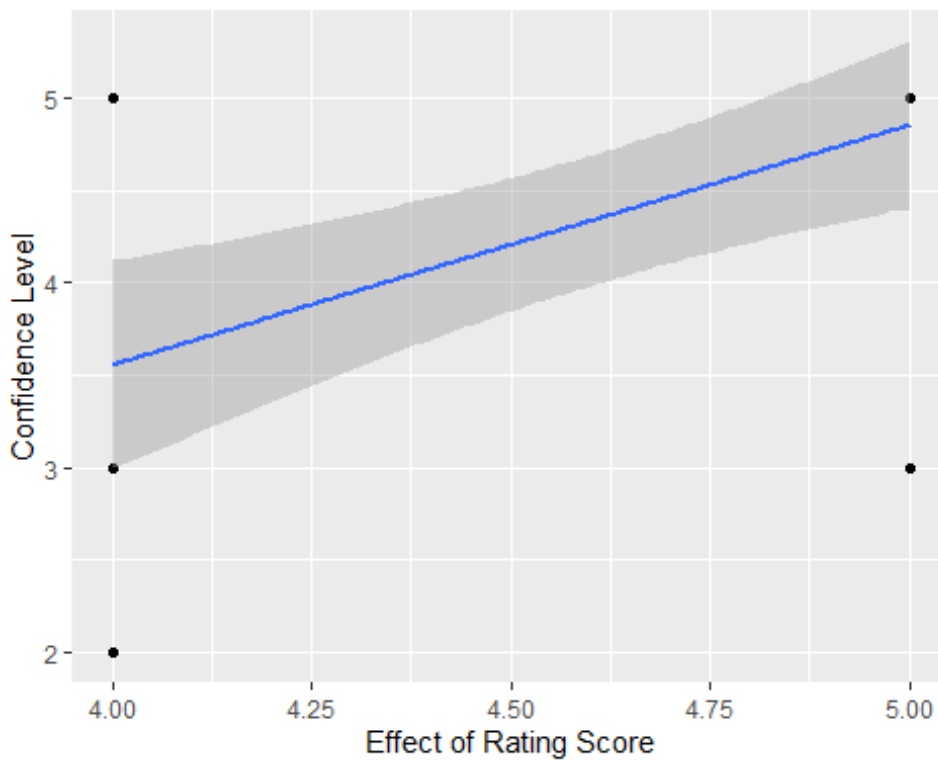
```
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.57378 -0.40135  0.07534  0.21836  1.65274
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.20469    1.87313  -1.177  0.25452
## Q11_1        -0.09522    0.21560  -0.442  0.66402
## Q11_2         0.23824    0.25954   0.918  0.37080
## Q11_3         1.45181    0.40018   3.628  0.00192 **
## Q11_4        -0.11264    0.22240  -0.507  0.61865
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8588 on 18 degrees of freedom
## Multiple R-squared:  0.4282, Adjusted R-squared:  0.3011
## F-statistic: 3.369 on 4 and 18 DF,  p-value: 0.03174
## `geom_smooth()` using formula 'y ~ x'
```



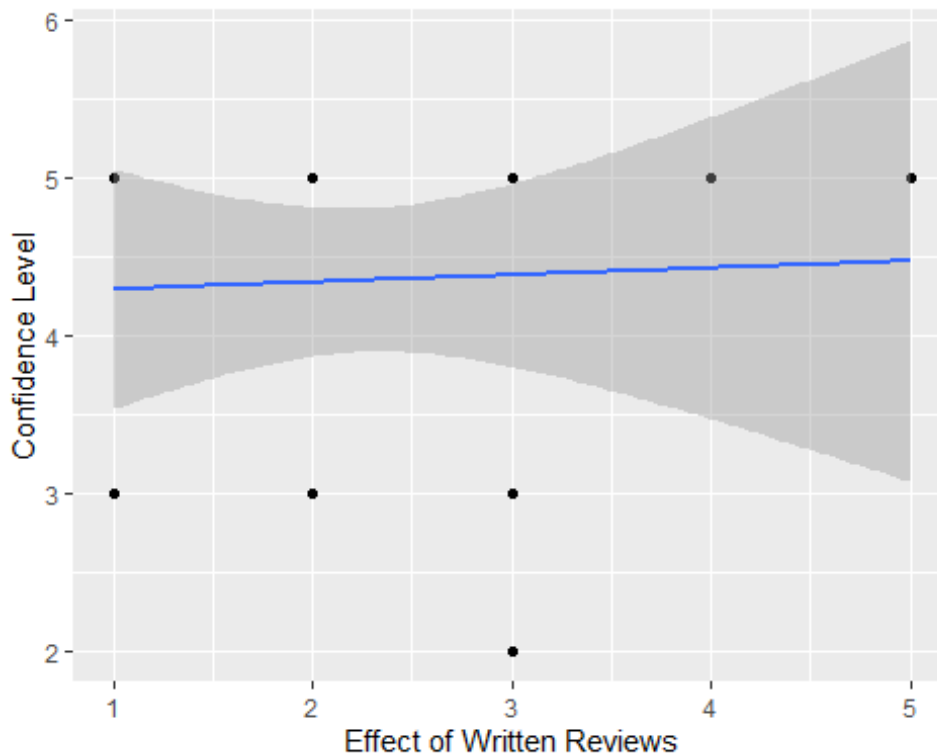
```
## `geom_smooth()` using formula 'y ~ x'
```



```
## `geom_smooth()` using formula 'y ~ x'
```

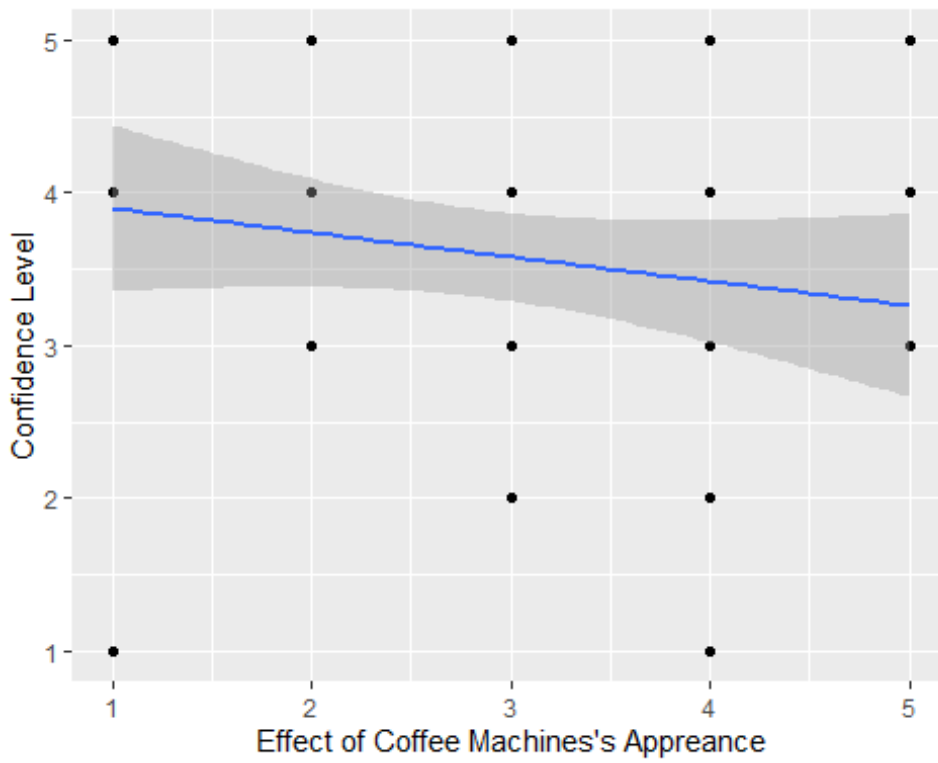


```
## `geom_smooth()` using formula 'y ~ x'
```

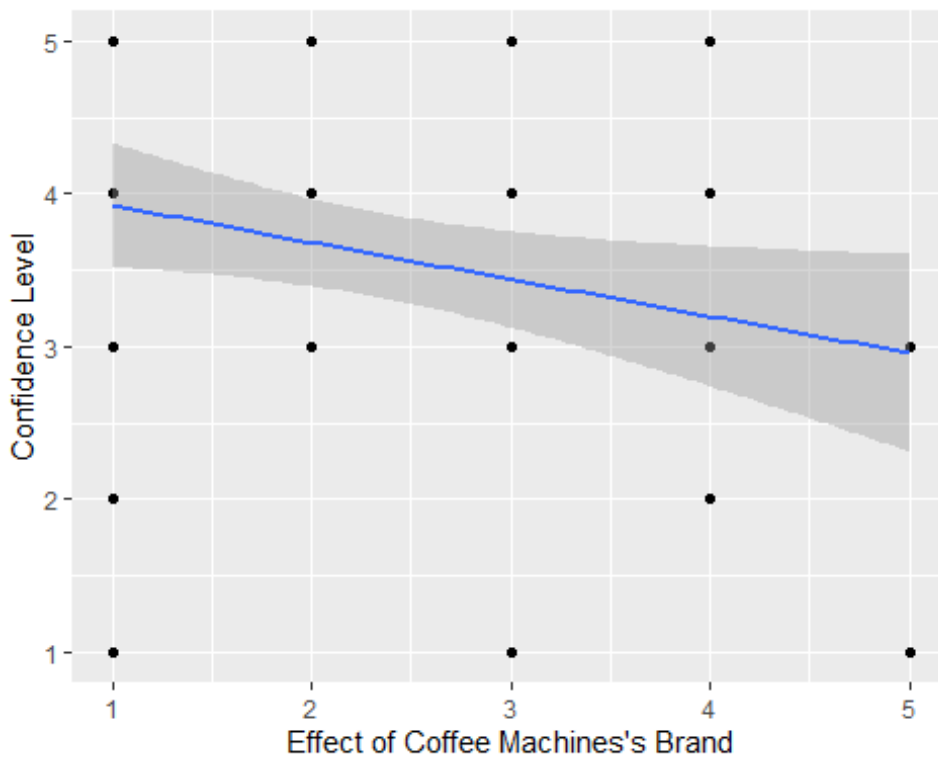


Amazon participants that chosen the book with low rating and positive reviews

```
##
## Call:
## lm(formula = Q33_1 ~ Q34_1 + Q34_2 + Q34_3 + Q34_4 + Q34_5, data =
## A_Low)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.4552 -0.6296  0.1557  0.6571  1.9036
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   3.47255    0.98333   3.531 0.000911 ***
## Q34_1          0.04902    0.14874   0.330 0.743143
## Q34_2         -0.18479    0.13755  -1.343 0.185326
## Q34_3          0.00677    0.13891   0.049 0.961328
## Q34_4          0.21034    0.15972   1.317 0.194003
## Q34_5         -0.17538    0.14862  -1.180 0.243691
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.025 on 49 degrees of freedom
## Multiple R-squared:  0.1589, Adjusted R-squared:  0.0731
## F-statistic: 1.852 on 5 and 49 DF,  p-value: 0.1202
## `geom_smooth()` using formula 'y ~ x'
```

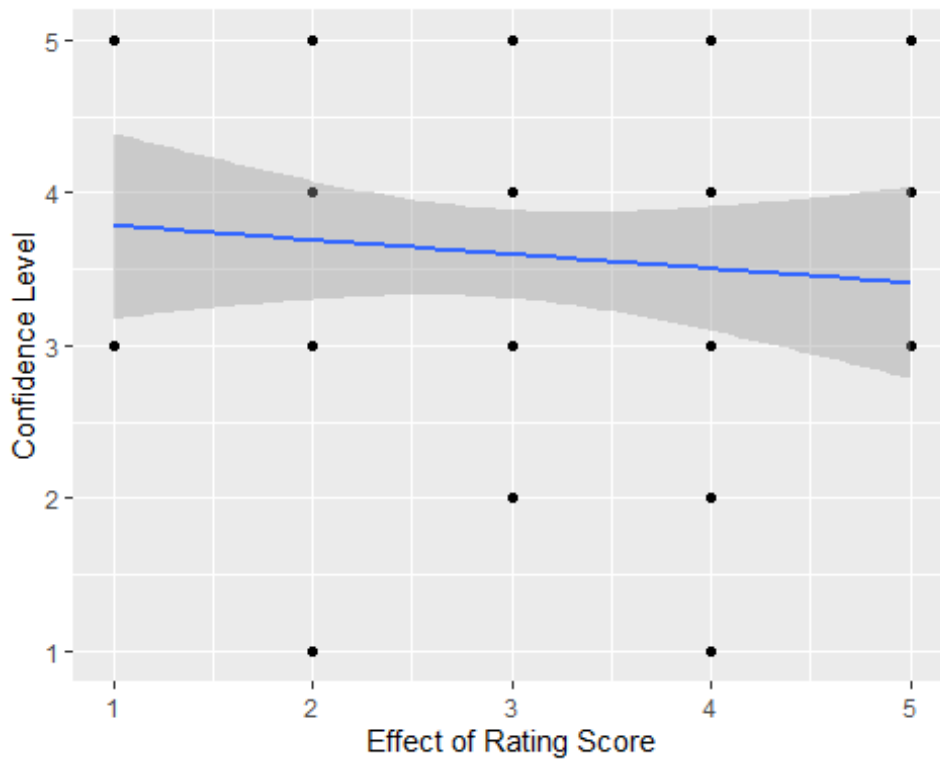


```
## `geom_smooth()` using formula 'y ~ x'
```

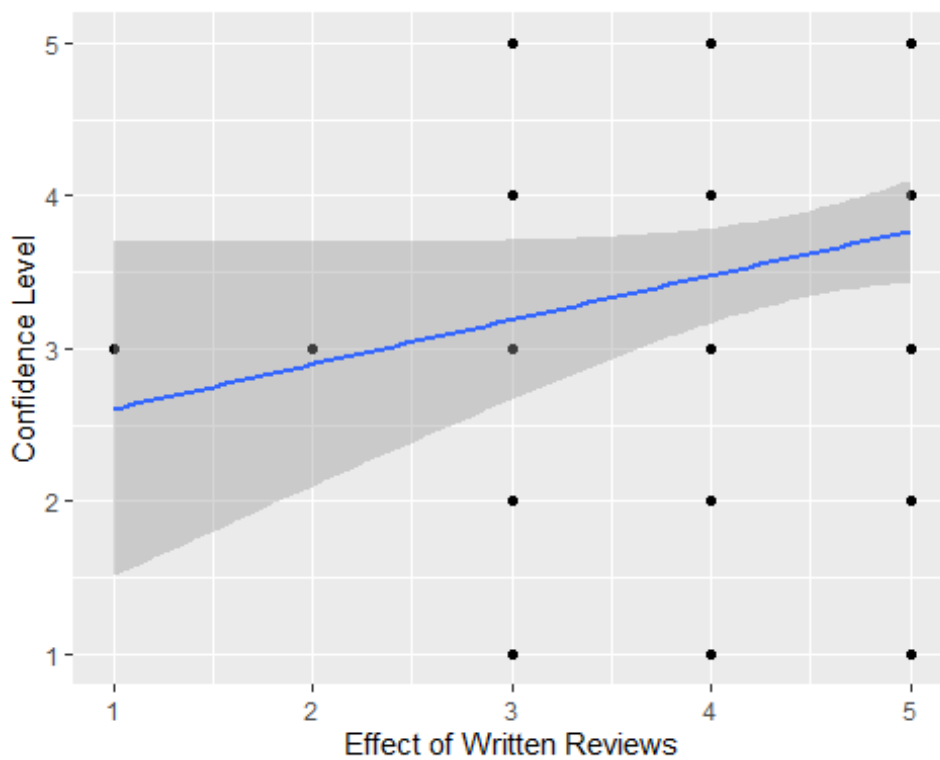


```
## `geom_smooth()` using formula 'y ~ x'
```

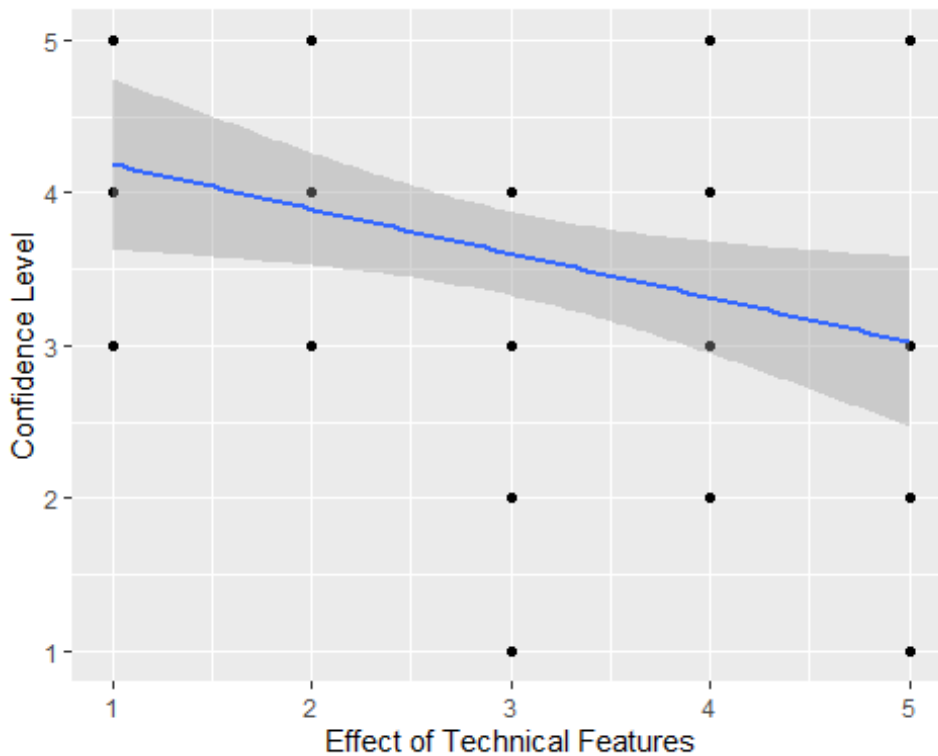




```
## `geom_smooth()` using formula 'y ~ x'
```

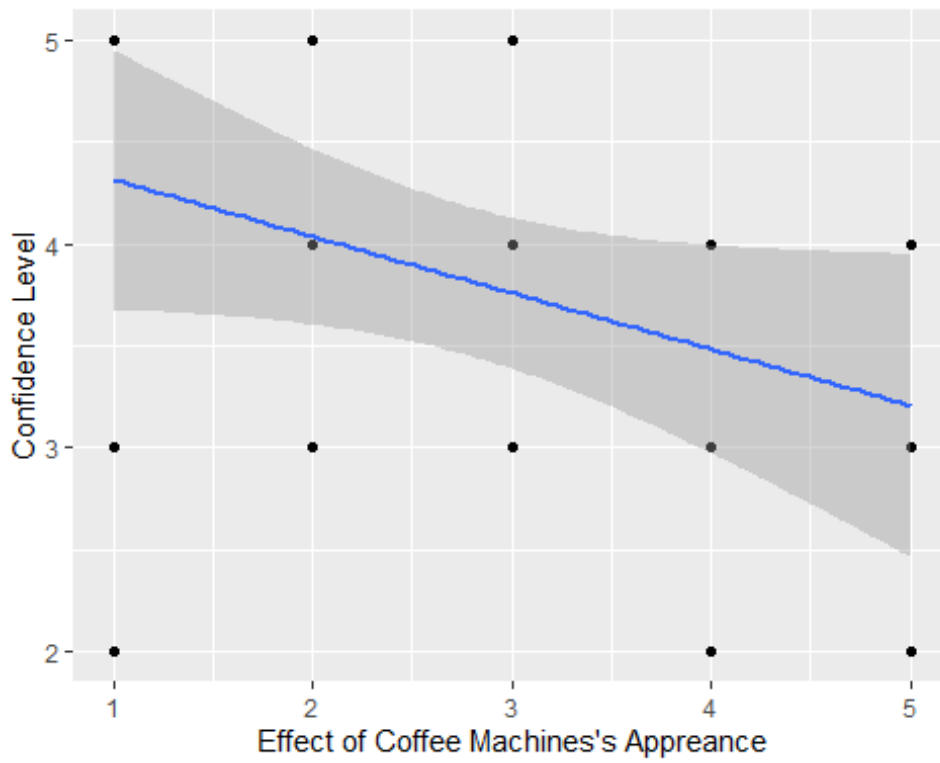


```
## `geom_smooth()` using formula 'y ~ x'
```

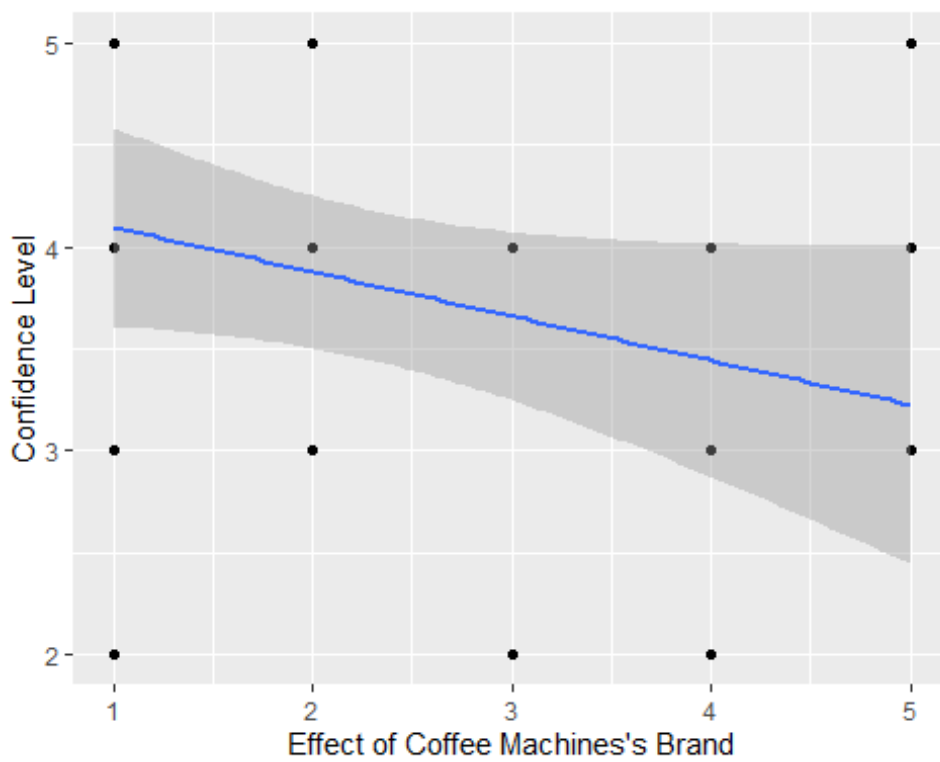


Amazon participants that chosen the book with high rating and negative reviews

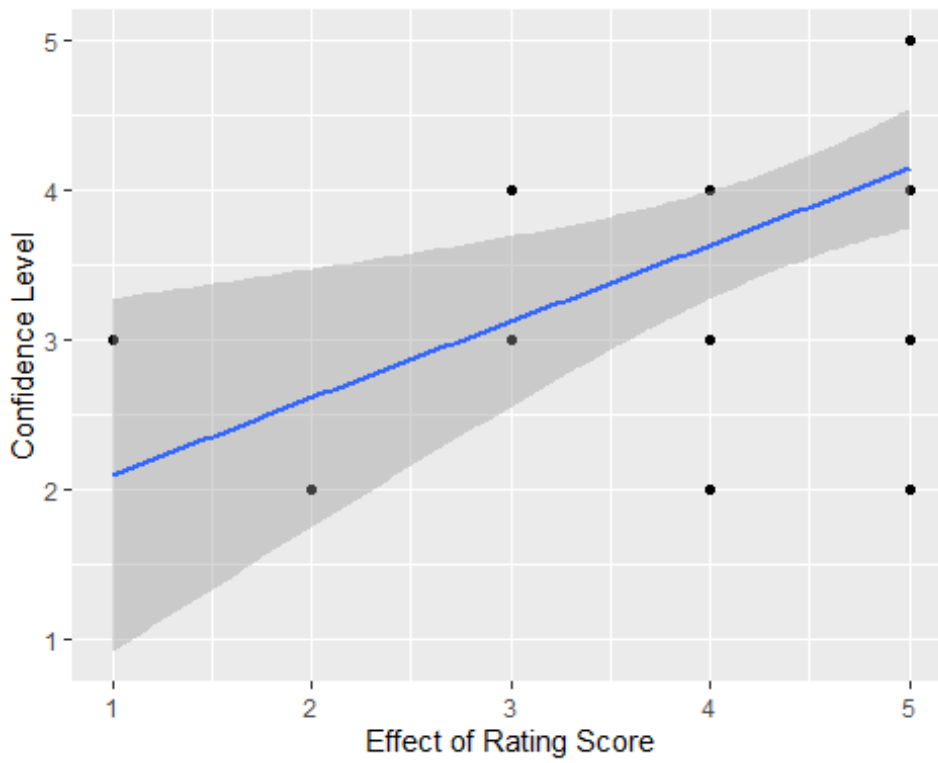
```
##
## Call:
## lm(formula = Q33_1 ~ Q34_1 + Q34_2 + Q34_3 + Q34_4 + Q34_5, data =
## A_High)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.3695 -0.4859  0.3294  0.7776  1.1394
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.38268    1.21775   1.957  0.0608 .
## Q34_1        -0.14719    0.16743  -0.879  0.3871
## Q34_2        -0.14021    0.14381  -0.975  0.3382
## Q34_3         0.43401    0.19768   2.196  0.0369 *
## Q34_4        -0.02321    0.17965  -0.129  0.8982
## Q34_5         0.15065    0.17778   0.847  0.4042
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9864 on 27 degrees of freedom
## Multiple R-squared:  0.2882, Adjusted R-squared:  0.1564
## F-statistic: 2.186 on 5 and 27 DF, p-value: 0.08536
## `geom_smooth()` using formula 'y ~ x'
```



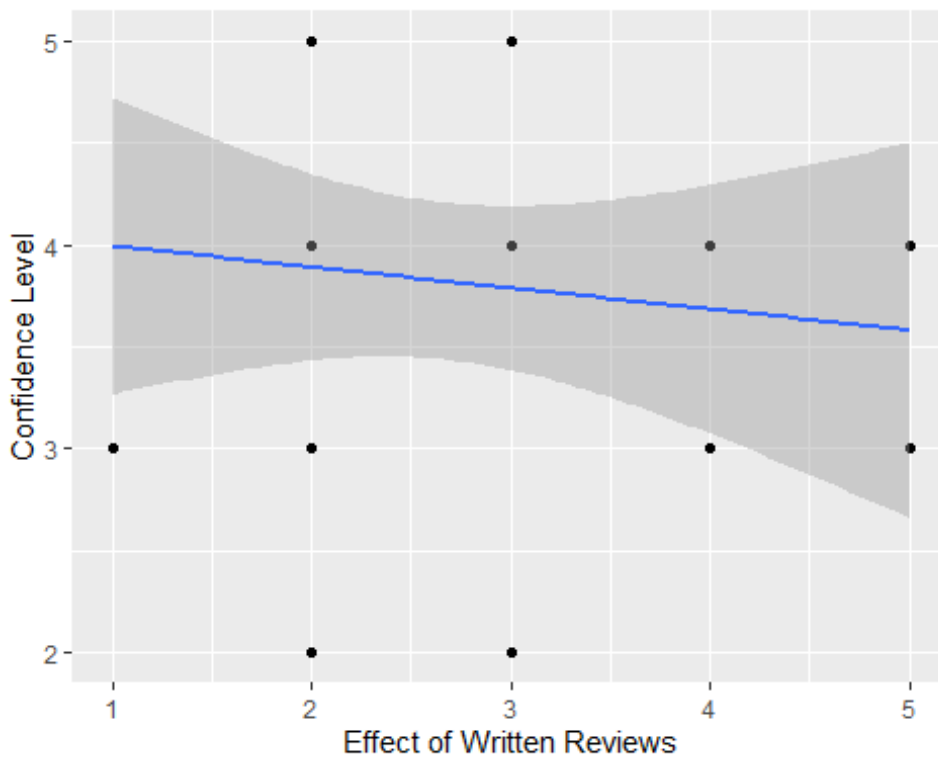
```
## `geom_smooth()` using formula 'y ~ x'
```



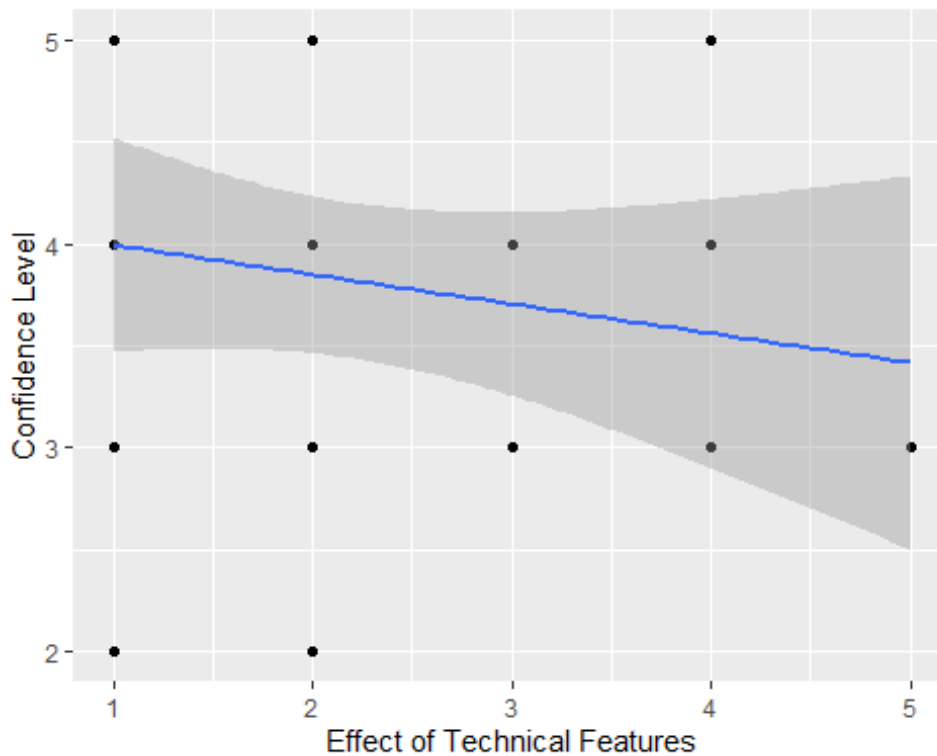
```
## `geom_smooth()` using formula 'y ~ x'
```



```
## `geom_smooth()` using formula 'y ~ x'
```



```
## `geom_smooth()` using formula 'y ~ x'
```



## Appendix D: Skewness Test and Pearson's Correlation Test

Check for Normal Distribution

```
## [1] 0.5317164
```

```
## [1] -0.221336
```

Correlation Analysis Between Variables

```
## [1] 0.7650699
```

```
## [1] -0.7168236
```

```
## [1] 0
```

```
## [1] 0.09179461
```

```
## [1] 0.5979343
```

```
## [1] -0.760431
```

```
##
```

```
## Pearson's product-moment correlation
```

```
##
```

```
## data: GR_All$High_Duration and GR_All$High_Att
```

```
## t = -2.2108, df = 75, p-value = 0.0301
```

---

```
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.44658620 -0.02474043
## sample estimates:
##      cor
## -0.2473486

##
## Pearson's product-moment correlation
##
## data: GR_All$Low_Duration and GR_All$High_Att
## t = -2.4938, df = 75, p-value = 0.01484
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.47147083 -0.05621816
## sample estimates:
##      cor
## -0.2767127

##
## Pearson's product-moment correlation
##
## data: GR_All$Confidence and GR_All$High_Att
## t = 0.67456, df = 75, p-value = 0.502
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.1489130 0.2964781
## sample estimates:
##      cor
## 0.07765596

##
## Pearson's product-moment correlation
##
## data: GR_All$Cover and GR_All$High_Att
## t = 0.56533, df = 75, p-value = 0.5735
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.1611905 0.2849614
## sample estimates:
##      cor
## 0.06514014

##
## Pearson's product-moment correlation
##
## data: GR_All$Title and GR_All$High_Att
## t = 0.77952, df = 75, p-value = 0.4381
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.1370829 0.3074538
## sample estimates:
##      cor
## 0.08964847
```

```
##
## Pearson's product-moment correlation
##
## data: GR_All$Rating and GR_All$High_Att
## t = 5.7927, df = 75, p-value = 1.527e-07
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.3792228 0.6935864
## sample estimates:
##      cor
## 0.555978

##
## Pearson's product-moment correlation
##
## data: GR_All$Review and GR_All$High_Att
## t = -9.3712, df = 75, p-value = 2.939e-14
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.8230136 -0.6109304
## sample estimates:
##      cor
## -0.7344152

## [1] NA

##
## Pearson's product-moment correlation
##
## data: GR_All$High_Duration and GR_All$Low_Att
## t = 1.6854, df = 75, p-value = 0.09608
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.03442729 0.39797578
## sample estimates:
##      cor
## 0.1910245

##
## Pearson's product-moment correlation
##
## data: GR_All$Low_Duration and GR_All$Low_Att
## t = 3.029, df = 75, p-value = 0.003364
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.1146474 0.5159731
## sample estimates:
##      cor
## 0.3301485

##
## Pearson's product-moment correlation
##
## data: GR_All$Confidence and GR_All$Low_Att
## t = 0.28134, df = 75, p-value = 0.7792
```

---

```
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.1929123 0.2545968
## sample estimates:
##      cor
## 0.03246953

##
## Pearson's product-moment correlation
##
## data: GR_All$Cover and GR_All$Low_Att
## t = -0.54233, df = 75, p-value = 0.5892
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.2825248 0.1637705
## sample estimates:
##      cor
## -0.06250096

##
## Pearson's product-moment correlation
##
## data: GR_All$Title and GR_All$Low_Att
## t = -0.56327, df = 75, p-value = 0.5749
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.2847433 0.1614216
## sample estimates:
##      cor
## -0.06490384

##
## Pearson's product-moment correlation
##
## data: GR_All$Rating and GR_All$Low_Att
## t = -3.7767, df = 75, p-value = 0.0003162
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.5724603 -0.1930395
## sample estimates:
##      cor
## -0.399735

##
## Pearson's product-moment correlation
##
## data: GR_All$Review and GR_All$Low_Att
## t = 9.036, df = 75, p-value = 1.272e-13
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.5940391 0.8142683
## sample estimates:
##      cor
## 0.7219596
```



```
## [1] NA
## [1] 0.5908843
## [1] -0.6310369
## [1] 0.09954023
## [1] -0.03435958
## [1] -0.02618615
## [1] 0.5452224
## [1] -0.6526408
## [1] -0.3117354

##
## Pearson's product-moment correlation
##
## data: A_All$High_Duration and A_All$High_Att
## t = -2.0094, df = 86, p-value = 0.04763
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.403321129 -0.002433049
## sample estimates:
##      cor
## -0.2117674

##
## Pearson's product-moment correlation
##
## data: A_All$Low_Duration and A_All$High_Att
## t = -2.4127, df = 86, p-value = 0.01796
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.43812115 -0.04469757
## sample estimates:
##      cor
## -0.2517827

##
## Pearson's product-moment correlation
##
## data: A_All$Confidence and A_All$High_Att
## t = 3.4216, df = 86, p-value = 0.0009548
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.1473967 0.5180378
## sample estimates:
##      cor
## 0.3461528

##
## Pearson's product-moment correlation
##
```

---

```
## data: A_All$Apper and A_All$High_Att
## t = 0.029521, df = 86, p-value = 0.9765
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.2063965 0.2124839
## sample estimates:
##      cor
## 0.003183324

##
## Pearson's product-moment correlation
##
## data: A_All$Brand and A_All$High_Att
## t = -1.8415, df = 86, p-value = 0.06899
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.38837395 0.01529097
## sample estimates:
##      cor
## -0.1947751

##
## Pearson's product-moment correlation
##
## data: A_All$Rating and A_All$High_Att
## t = 4.4572, df = 86, p-value = 2.491e-05
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.2460745 0.5891779
## sample estimates:
##      cor
## 0.4331908

##
## Pearson's product-moment correlation
##
## data: A_All$Review and A_All$High_Att
## t = -5.5278, df = 86, p-value = 3.416e-07
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.6515842 -0.3389192
## sample estimates:
##      cor
## -0.5120165

##
## Pearson's product-moment correlation
##
## data: A_All$Tech and A_All$High_Att
## t = -1.6213, df = 86, p-value = 0.1086
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.36837410 0.03861605
## sample estimates:
```

```
##      cor
## -0.1722191

## [1] NA

##
## Pearson's product-moment correlation
##
## data:  A_All$High_Duration and A_All$Low_Att
## t = 1.3635, df = 86, p-value = 0.1763
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.0659868  0.3444149
## sample estimates:
##      cor
## 0.1454659

##
## Pearson's product-moment correlation
##
## data:  A_All$Low_Duration and A_All$Low_Att
## t = 2.9793, df = 86, p-value = 0.003755
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.1030226  0.4842836
## sample estimates:
##      cor
## 0.3058651

##
## Pearson's product-moment correlation
##
## data:  A_All$Confidence and A_All$Low_Att
## t = 0.54384, df = 86, p-value = 0.588
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.1527721  0.2647395
## sample estimates:
##      cor
## 0.05854333

##
## Pearson's product-moment correlation
##
## data:  A_All$Apper and A_All$Low_Att
## t = -0.16444, df = 86, p-value = 0.8698
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.2263307  0.1924279
## sample estimates:
##      cor
## -0.01772883

##
## Pearson's product-moment correlation
```

---

```
##
## data: A_All$Brand and A_All$Low_Att
## t = -0.93219, df = 86, p-value = 0.3538
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.3031091 0.1117673
## sample estimates:
##      cor
## -0.1000162

##
## Pearson's product-moment correlation
##
## data: A_All$Rating and A_All$Low_Att
## t = -4.0236, df = 86, p-value = 0.0001228
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.5607253 -0.2057359
## sample estimates:
##      cor
## -0.3980272

##
## Pearson's product-moment correlation
##
## data: A_All$Review and A_All$Low_Att
## t = 6.4933, df = 86, p-value = 5.186e-09
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.4138418 0.6990366
## sample estimates:
##      cor
## 0.5735694

##
## Pearson's product-moment correlation
##
## data: A_All$Tech and A_All$Low_Att
## t = 2.8243, df = 86, p-value = 0.005888
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.08721784 0.47198087
## sample estimates:
##      cor
## 0.2913382

## [1] NA
## [1] 0.7586472
## [1] -0.7179699
## [1] 0.2793611
## [1] -0.02157072
```

```
## [1] 0.09667105
## [1] 0.5935428
## [1] -0.8388834

##
## Pearson's product-moment correlation
##
## data: TA_All$High_Duration and TA_All$High_Att
## t = -1.1682, df = 85, p-value = 0.246
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.32767554 0.08725479
## sample estimates:
##      cor
## -0.1257039

##
## Pearson's product-moment correlation
##
## data: TA_All$Low_Duration and TA_All$High_Att
## t = -2.058, df = 85, p-value = 0.04265
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.40970739 -0.00756019
## sample estimates:
##      cor
## -0.2178615

##
## Pearson's product-moment correlation
##
## data: TA_All$Confidence and TA_All$High_Att
## t = 2.5188, df = 85, p-value = 0.01365
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.05600421 0.44925147
## sample estimates:
##      cor
## 0.2635434

##
## Pearson's product-moment correlation
##
## data: TA_All$Apper and TA_All$High_Att
## t = 0.12332, df = 85, p-value = 0.9021
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.1978311 0.2233934
## sample estimates:
##      cor
## 0.01337455
```

---

```
##
## Pearson's product-moment correlation
##
## data: TA_All$Name and TA_All$High_Att
## t = 2.3232, df = 85, p-value = 0.02256
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.03552806 0.43272303
## sample estimates:
##      cor
## 0.2443476

##
## Pearson's product-moment correlation
##
## data: TA_All$Rating and TA_All$High_Att
## t = 5.9414, df = 85, p-value = 6.024e-08
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.3736868 0.6752879
## sample estimates:
##      cor
## 0.5416947

##
## Pearson's product-moment correlation
##
## data: TA_All$Review and TA_All$High_Att
## t = -10.613, df = 85, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.8330839 -0.6471809
## sample estimates:
##      cor
## -0.7549137

## [1] NA

##
## Pearson's product-moment correlation
##
## data: TA_All$High_Duration and TA_All$Low_Att
## t = 0.77283, df = 85, p-value = 0.4418
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.1293923 0.2890941
## sample estimates:
##      cor
## 0.08353275

##
## Pearson's product-moment correlation
##
## data: TA_All$Low_Duration and TA_All$Low_Att
## t = 1.8316, df = 85, p-value = 0.07052
```

```
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.01647099 0.38951378
## sample estimates:
##      cor
## 0.1948533

##
## Pearson's product-moment correlation
##
## data: TA_All$Confidence and TA_All$Low_Att
## t = -0.83042, df = 85, p-value = 0.4086
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.2947859 0.1232695
## sample estimates:
##      cor
## -0.08970813

##
## Pearson's product-moment correlation
##
## data: TA_All$Apper and TA_All$Low_Att
## t = 1.4128, df = 85, p-value = 0.1614
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.06112315 0.35092630
## sample estimates:
##      cor
## 0.1514754

##
## Pearson's product-moment correlation
##
## data: TA_All$Name and TA_All$Low_Att
## t = -1.0912, df = 85, p-value = 0.2783
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.32025827 0.09547266
## sample estimates:
##      cor
## -0.1175394

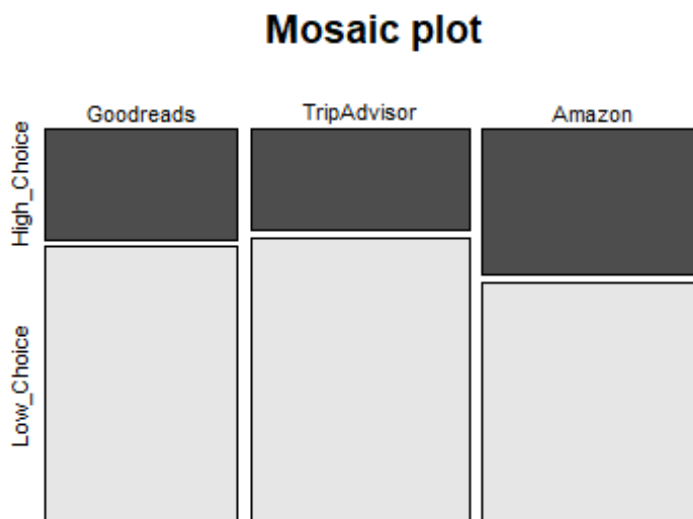
##
## Pearson's product-moment correlation
##
## data: TA_All$Rating and TA_All$Low_Att
## t = -4.8766, df = 85, p-value = 4.971e-06
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.6174049 -0.2849868
## sample estimates:
##      cor
## -0.4675661
```

```
##  
## Pearson's product-moment correlation  
##  
## data: TA_All$Review and TA_All$Low_Att  
## t = 8.7888, df = 85, p-value = 1.445e-13  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## 0.5608686 0.7863513  
## sample estimates:  
##      cor  
## 0.6899965  
  
## [1] NA
```

## Appendix E: Data Analysis for Hypotheses 1

### Appendix E1: Chi-Square Test

```
##      Mode  FALSE  TRUE  
## logical    55    33  
  
##           High_Choice Low_Choice  
## Goodreads    23.83333  53.16667  
## TripAdvisor    26.92857  60.07143  
## Amazon        27.23810  60.76190
```





## Appendix F: Results for Hypothesis 2

### Appendix F1: Logistic Regression

```
##
## Call:
## glm(formula = ChoiceBinary ~ High_Duration + Low_Duration, family =
## "binomial",
## data = All_Data)
##
## Deviance Residuals:
##   Min       1Q   Median       3Q      Max
## -1.2196  -0.9324  -0.6688   1.2710   2.5889
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)   0.162931   0.273242   0.596  0.55098
## High_Duration -0.002841   0.007041  -0.403  0.68665
## Low_Duration  -0.032448   0.009986  -3.249  0.00116 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##   Null deviance: 311.83  on 251  degrees of freedom
## Residual deviance: 288.36  on 249  degrees of freedom
## AIC: 294.36
##
## Number of Fisher Scoring iterations: 6
##
## Warning in confusionMatrix.default(data = fitresult_time, reference =
## All_test$ChoiceBinary): Levels are not in the same order for reference
## and data.
## Refactoring data to match.
##
##      Length Class  Mode
## positive  1    -none- character
## table     4     table  numeric
## overall   7    -none- numeric
## byClass  11    -none- numeric
## mode      1    -none- character
## dots      0    -none- list
```

### Appendix F2: Linear Regression

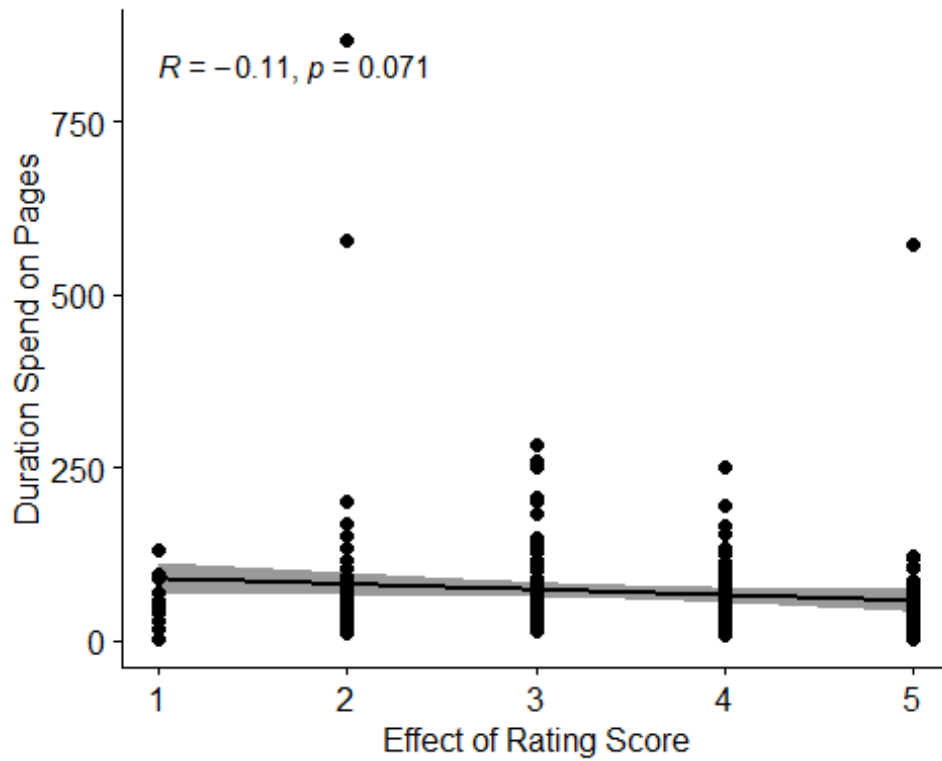
```
##
## Call:
## lm(formula = Rating ~ High_Duration + Low_Duration, data = All_Data)
##
## Residuals:
##   Min       1Q   Median       3Q      Max
## -2.5809  -0.5437   0.4287   0.7580   2.3588
```

```
##
## Coefficients:
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.587715   0.103634  34.619 <2e-16 ***
## High_Duration -0.001634   0.002045  -0.799   0.425
## Low_Duration -0.001657   0.001202  -1.379   0.169
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.186 on 249 degrees of freedom
## Multiple R-squared:  0.01302,    Adjusted R-squared:  0.005093
## F-statistic: 1.642 on 2 and 249 DF,  p-value: 0.1956

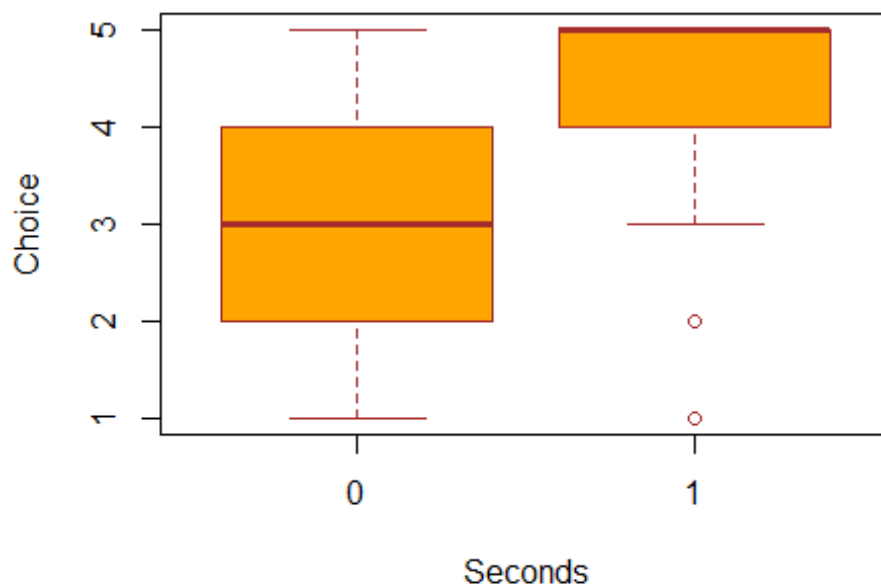
##
## Call:
## lm(formula = Rating ~ High_Duration + Low_Duration, data = All_train)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.6150 -0.5694  0.4006  0.8825  2.3085
##
## Coefficients:
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.623391   0.112427  32.229 <2e-16 ***
## High_Duration -0.002400   0.002113  -1.136   0.257
## Low_Duration -0.001531   0.001217  -1.258   0.210
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.19 on 202 degrees of freedom
## Multiple R-squared:  0.01845,    Adjusted R-squared:  0.008729
## F-statistic: 1.898 on 2 and 202 DF,  p-value: 0.1525

##      Min. 1st Qu.  Median      Mean 3rd Qu.      Max.
##  0.7498  0.7498  0.7498  0.7498  0.7498  0.7498

## `geom_smooth()` using formula 'y ~ x'
```



### Time Spent on High Rating/Negative Review Page



```
##
## Call:
## lm(formula = Rating ~ PageDuration, data = All_High)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.9736 -0.5452  0.3647  0.5465  0.8703
##
```

```
## Coefficients:
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.775443   0.160985  29.664 <2e-16 ***
## PageDuration -0.006154   0.002892  -2.128  0.0366 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7679 on 76 degrees of freedom
## Multiple R-squared:  0.05622, Adjusted R-squared:  0.0438
## F-statistic: 4.527 on 1 and 76 DF, p-value: 0.03661

##
## Call:
## lm(formula = Rating ~ PageDuration, data = All_Low)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.02014 -1.00865 -0.01228  0.98128  1.99786
##
## Coefficients:
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.0013650  0.1048285  28.631 <2e-16 ***
## PageDuration 0.0001969  0.0008423   0.234  0.815
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.053 on 172 degrees of freedom
## Multiple R-squared:  0.0003177, Adjusted R-squared: -0.005494
## F-statistic: 0.05467 on 1 and 172 DF, p-value: 0.8154

##
## Call:
## lm(formula = High_Att ~ PageDuration, data = All_train)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.5737 -1.4067 -0.4072  1.4632  3.7253
##
## Coefficients:
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.648158   0.156985  23.239 < 2e-16 ***
## PageDuration -0.004779   0.001365  -3.501 0.000569 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.747 on 203 degrees of freedom
## Multiple R-squared:  0.05695, Adjusted R-squared:  0.0523
## F-statistic: 12.26 on 1 and 203 DF, p-value: 0.0005694

##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.7519  0.7519  0.7519  0.7519  0.7519  0.7519
```

## Appendix F3: Pearson's Correlation Test

```
##
## Pearson's product-moment correlation
##
## data: All_Data$Rating and All_Data$pageDuration
## t = -1.8161, df = 250, p-value = 0.07056
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.234375885 0.009600333
## sample estimates:
##      cor
## -0.1141079

##
## Pearson's product-moment correlation
##
## data: All_Data$High_Att and All_Data$pageDuration
## t = -3.4598, df = 250, p-value = 0.0006355
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.32865005 -0.09263241
## sample estimates:
##      cor
## -0.2137584
```

## Appendix G: Data Analysis for Hypotheses 3

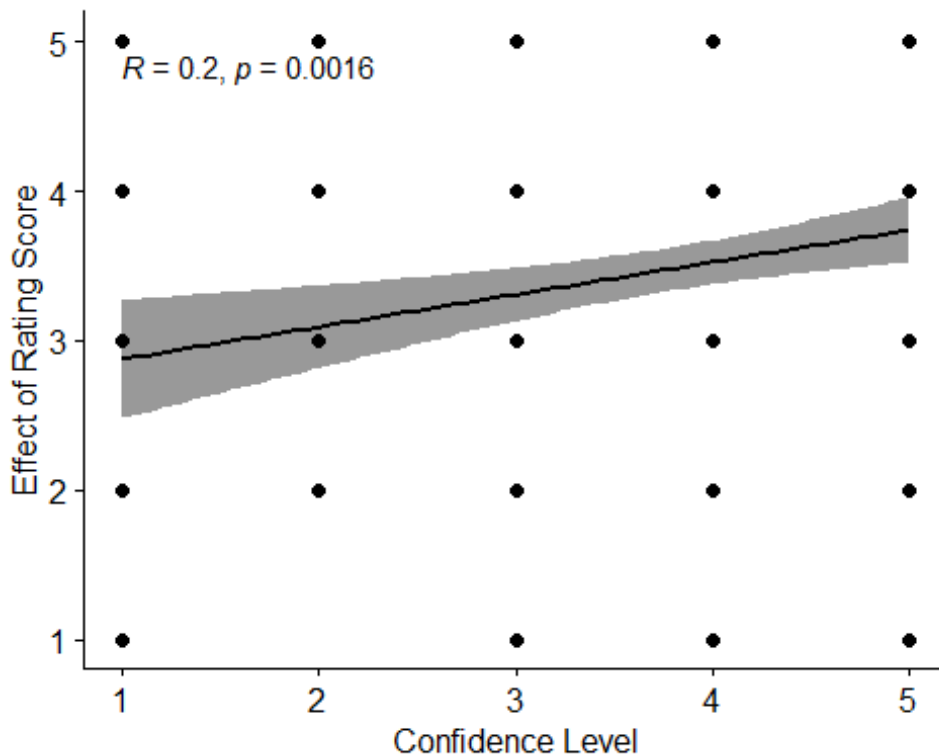
### Appendix G1: Linear Regression

```
##
## Call:
## lm(formula = Confidence ~ Rating + Review, data = All_Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -3.1568 -0.7310  0.2690  0.9718  1.6947
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.77095    0.39538   7.008 2.25e-11 ***
## Rating       0.21287    0.06390   3.331 0.000996 ***
## Review       0.06430    0.05979   1.075 0.283264
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.069 on 249 degrees of freedom
## Multiple R-squared:  0.04362,    Adjusted R-squared:  0.03594
## F-statistic: 5.679 on 2 and 249 DF,  p-value: 0.003875
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## 0.7743  0.7743  0.7743  0.7743  0.7743  0.7743
```

## Appendix G2: Pearson's Correlation Test

```
##
## Pearson's product-moment correlation
##
## data: All_Data$Confidence and All_Data$Rating
## t = 3.1929, df = 250, p-value = 0.001589
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.07623529 0.31383959
## sample estimates:
##      cor
## 0.1979434
##
## Pearson's product-moment correlation
##
## data: All_Data$Confidence and All_Data$Review
## t = -0.50098, df = 250, p-value = 0.6168
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.15463647 0.09226514
## sample estimates:
##      cor
## -0.03166878
## `geom_smooth()` using formula 'y ~ x'
```



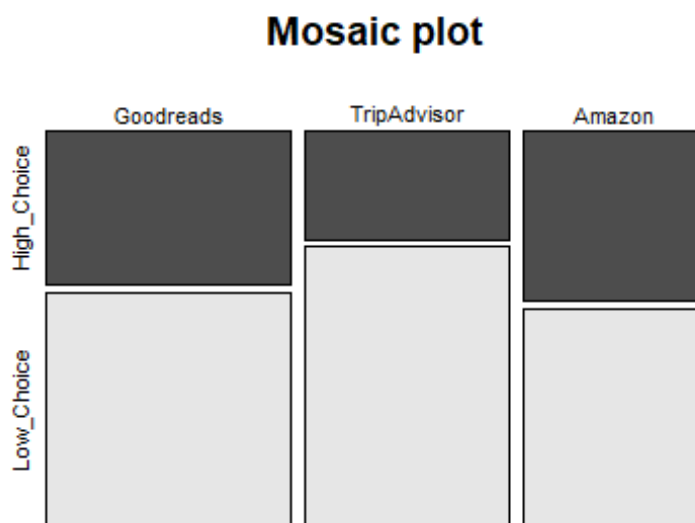
## Appendix G3: ANOVA

```
##           Df Sum Sq Mean Sq F value Pr(>F)
## Rating      1  11.66   11.665   10.201 0.00158 **
## Review      1   1.32    1.322    1.156 0.28326
## Residuals 249 284.73    1.143
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

## Appendix H: Results for Group that Failed Attention Check

### Appendix H1: Chi-squared test for H1

```
##
## Pearson's Chi-squared test
##
## data:  tab
## X-squared = 3.208, df = 2, p-value = 0.2011
```



## Appendix H2: Logistic Regression for H2

```
##
## Call:
## glm(formula = ChoiceBinary ~ High_Duration + Low_Duration, family =
## "binomial",
## data = All_Data)
##
## Deviance Residuals:
##   Min       1Q   Median       3Q      Max
## -1.3194 -1.0632 -0.6662  1.1744  1.9146
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.365355  0.276493  1.321  0.18637
## High_Duration -0.045929  0.017692 -2.596  0.00943 **
## Low_Duration -0.009303  0.011544 -0.806  0.42033
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##   Null deviance: 228.08  on 170  degrees of freedom
## Residual deviance: 212.90  on 168  degrees of freedom
## AIC: 218.9
##
## Number of Fisher Scoring iterations: 4
##
##      Length Class Mode
## positive  1    -none- character
## table     4    table  numeric
## overall   7    -none- numeric
## byClass   11   -none- numeric
## mode      1    -none- character
## dots      0    -none- list
```

## Appendix H3: Linear Regression for H2

```
##
## Call:
## lm(formula = High_Att ~ PageDuration, data = All_train)
##
## Residuals:
##   Min       1Q   Median       3Q      Max
## -3.114 -1.102 -0.022  1.150  3.627
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.397494  0.207009  21.243 < 2e-16 ***
## PageDuration -0.015973  0.004404 -3.627 0.000402 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```



```
## Residual standard error: 1.625 on 138 degrees of freedom
## Multiple R-squared:  0.08704,    Adjusted R-squared:  0.08042
## F-statistic: 13.16 on 1 and 138 DF,  p-value: 0.0004023

##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.7477  0.7477  0.7477  0.7477  0.7477  0.7477
```

## Appendix H4: Correlation Test for H2

```
##
## Pearson's product-moment correlation
##
## data: All_Data$Rating and All_Data$PageDuration
## t = -1.9172, df = 169, p-value = 0.0569
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.289627089  0.004269823
## sample estimates:
##      cor
## -0.1458961

##
## Pearson's product-moment correlation
##
## data: All_Data$High_Att and All_Data$PageDuration
## t = -4.0223, df = 169, p-value = 8.675e-05
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.4267250 -0.1522633
## sample estimates:
##      cor
## -0.2955815
```

## Appendix H5: Linear Regression Analysis for H3

```
##
## Call:
## lm(formula = Confidence ~ Rating + Review, data = All_Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -3.1011 -0.5645  0.1314  0.4652  2.2343
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.43182    0.33092   7.349 8.31e-12 ***
## Rating       0.10138    0.06704   1.512 0.132338
## Review       0.23248    0.06913   3.363 0.000954 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9347 on 168 degrees of freedom
```

---

```
## Multiple R-squared:  0.09189,    Adjusted R-squared:  0.08108
## F-statistic:    8.5 on 2 and 168 DF,  p-value: 0.0003045

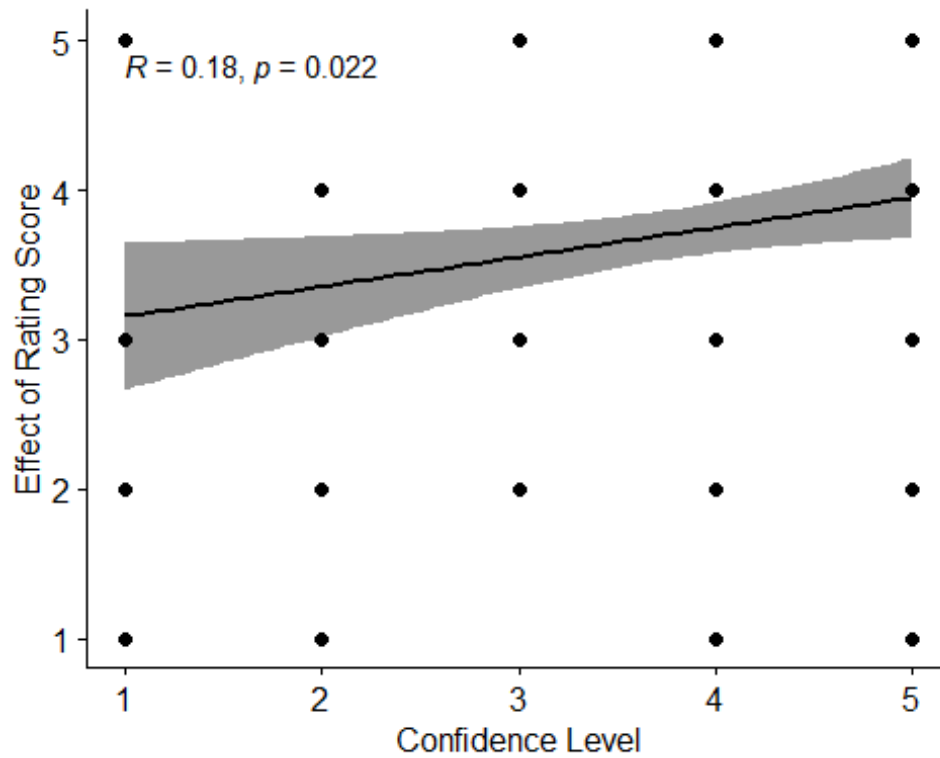
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## 0.8411  0.8411  0.8411  0.8411  0.8411  0.8411
```

### Appendix H6: Correlation Test for H3

```
##
## Pearson's product-moment correlation
##
## data: All_Data$Confidence and All_Data$Rating
## t = 2.3155, df = 169, p-value = 0.02179
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.02596779 0.31708475
## sample estimates:
##      cor
## 0.1753568

##
## Pearson's product-moment correlation
##
## data: All_Data$Confidence and All_Data$Review
## t = 3.8212, df = 169, p-value = 0.0001864
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.1377636 0.4145344
## sample estimates:
##      cor
## 0.2820057

## `geom_smooth()` using formula 'y ~ x'
```



### Appendix H7: ANOVA for H3

```
##           Df Sum Sq Mean Sq F value  Pr(>F)
## Rating      1   4.97   4.970    5.689 0.018188 *
## Review      1   9.88   9.882   11.311 0.000954 ***
## Residuals  168 146.77   0.874
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```