### Method

#### Participants

Twenty four native English speakers from the University of Manchester were recruited via opportunity sampling. The experiment lasted around 30 minutes and each participant was compensated with £5.

#### Design and materials

The experimental items were 18 vignettes (see Appendix). Each vignette was six sentences long. The first three sentences provided context. The next sentence manipulated the explanatory goodness of fit such that the subsequent conditional consequent would have either a ‘high’ or ‘low’ goodness of fit. The fifth sentence contained the conditional and the final sentence contained additional contextual information.

This resulted in a one way repeated measures design with one IV, Contextual Fit with two levels (High & Low) (see Figure 1).

|  |  |
| --- | --- |
| Contextual Fit | |
| High | Low |
| Brian tells Mary that he thinks he heard that a nearby village has been flooded. The village is located near the sea side. However, it is also in a valley below a dammed reservoir. Mary remembers that the dam has been in a terribly bad state for some time. Mary thinks that if the village has been flooded, |**then the dam has broken.** critical region| **The dam was the responsibility of the local authority.** Spillover region| | Brian tells Mary that he thinks he heard that a nearby village has been flooded. The village is located near the sea side. However, it is also in a valley below a dammed reservoir. Mary remembers that the dam has recently passed a safety inspection. Mary thinks that |if the village has been flooded, |**then the dam has broken.** critical region**| The dam was the responsibility of the local authority.** Spillover region| |

*Figure 1:* Example of the two experimental conditions in the experiment. The analysis region are highlighted in bold and delimited by vertical bars.

There were two versions of each item (36 permutations in total). Using a Latin-square design the vignettes were split into two lists with each participant seeing nine experimental items from each condition. Each list also contained 9 filler passages which did not contain conditionals. Twelve participants were randomly assigned to each list. The lists contained 18 experimental items interspersed with 9 filler items. Comprehension questions followed 25% of the items.

#### Procedure

An Eyelink 1000 in the desktop mount configuration was used to record eye movements. Head position was stabilised using a chin and forehead rest. Viewing was binocular and recordings were sampled from the right eye at 1,000Hz. The vignettes were presented in size 22 Arial font on a LCD monitor 60 centimeters from the participants’ eyes. Each character subtended 0.741° of visual arc. The eye-tracker was calibrated using nine fixation points. Participants were instructed to read at their normal reading rate for comprehension. Each trial appeared after the participant fixated on a gaze trigger. After reading the vignette participants pressed a button on a handheld controller to reveal either a comprehension question or the next trial.

### Results

We analysed two regions of interest, which were the conditional consequent and the final sentence (see Figure 1). An automatic procedure pooled fixations shorter than 80 msec. with adjacent fixations. It also excluded fixations that were shorter than 40 msec. if they were not within three characters of another fixation and truncated fixations longer than 1,200 msec.

We analysed five processing measures (see below for definitions). The first two provide information about processing as a region of text is first encountered (1-2), with the third (3) containing information from later processing where a region in revisited. The fourth (4) contains information from both early and intermediate processing. The final measure (5) accounts for both early and later processes, as a region of text is revisited.

1. First pass reading time is the sum of all the fixation durations in msec. from the eye first entering the region until first exiting either to the left or right.

2. First pass regressions out is the percentage of trials in which regressive saccades were made from the current most rightward fixation into an earlier region.

3. *Regressions in* is the percentage of trials in which one or more ﬁxations in a region are made following a regressive saccade from a later region.

4. Regression path reading time is the sum of all fixation durations in msec. from the eye first entering a region until first exiting the region to the right (including all re-reading of previously read text).

5. Total reading time is the sum of all fixation durations in a region in msec.

Analyses of effects were performed by fitting linear mixed models (Baayen, Davidson, & Bates, 2008) for the reading time measures, using the *lme4* package (Bates, Maechler, Bolker & Walker, 2015) in *R* (R Core Team, 2015), and logit mixed models for the binomial measures (Jaeger, 2008). The *lsmeans* package was used to generate means and standard errors for all models (Lenth, 2016). Analyses were carried out using Contextual Fit as a fixed factor and subjects and items as crossed random factors (Baayen et al., 2008). We used the maximal random effects structure where possible: random intercepts for subjects and items, as well as by-subject and by-item random slopes on the Contextual Fit fixed factor (Barr et al., 2013). This was the case for all analyses on the reading time measures, except regression path reading times on the consequent region. For regression path reading times on the consequent this structure did not converge and so random intercepts were used for subjects and items but only random slopes for Contextual Fit on the subjects. For the binomial measure of regressions in on the consequent, the maximal structure also did not converge and so random intercepts were used for subjects and items but only random slopes for Contextual Fit on the items. For the spillover region both binomial measures (first pass regressions out and regressions in) did not converge using the maximal structure. For first pass regressions out random intercepts were used for subjects and items but only random slopes for Contextual Fit on the subjects was used. However, due to the lack of regressions in to the spillover region no model would converge, therefore, no analysis was performed on this measure for this region. When presenting the results of the linear and logit mixed models results we report regression coefficients (b), standard errors (SE), and t-values (for duration measures) or z-values (for the binomial measure) using restricted maximum likelihood estimation. Absolute values of the t-value and z-value greater than or equal to 1.96 indicate an effect that is significant at approximately the .05 alpha level.

The key comparisons were always between lexically identical regions of text. The descriptive statistics for each eye movement measure are displayed in Table 1 and the results of the Linear Mixed Models are reported in Table 2.

Table 1: *Mean reading times and regressions to each region (standard errors in parenthesis).*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Contextual Fit | First-pass (msec.) | Regressions In | First-pass Regressions Out % | Regression Path (msec.) | Total Time (msec.) |
| Consequent Region | |  |  |  |  |
| High | 802 (62) | 04 (2) | 12 (3) | 960 (92) | 922 (87) |
| Low | 845 (73) | 04 (2) | 14 (5) | 1,138 (97) | 985 (80) |
| **Spillover Region** | |  |  |  |  |
| High | 2,077 (147) | N/A | 40 (5) | 2743 (224) | 2271 (167) |
| Low | 2,069 (166) | N/A | 54 (5) | 3052 (322) | 2238 (167) |

Table 2: *Results of the linear mixed models for each measure of interest. Significant effects are highlighted in bold.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Duration measures | | | | | | | | | | | | | | | | | | | | | | | | | Binomial measures | | | | | | | | | | | | | | |
|  | | First Pass | | | | | | Regression Path | | | | | | | | | | | | Total Time | | | | | | | Regressions Out | | | | | | | | | | | Regressions In | | | |
|  | | b | SE | | t | | | | b | | | | SE | | t | | | | | b | | SE | | | t | | | | | b | | | SE | | | z | | | b | SE | z |
| Consequent Region | | | |  | | |  | | |  | |  | |  | | |  | |  | |  | |  |  | |  | | |  | | |  | | | | | | | | | |
| Intercept | | **801.67** | **62.19** | | **12.89** | | | | **960.45** | | | | **91.69** | | **10.47** | | | | | **921.67** | | **86.74** | | | **10.63** | | | | | **-1.91** | | | **0.25** | | | **7.70** | | | **3.08** | **0.42** | **7.31** |
| Contextual Fit | | 43.22 | 42.80 | | 1.01 | | | | **177.96** | | | | **72.93** | | **2.44** | | | | | 63.65 | | 44.21 | | | 1.44 | | | | | 0.14 | | | 0.38 | | | 0.38 | | | 0.10 | 0.61 | 0.16 |
| **Spillover Region** | | | |  | |  | |  | | |  | | |  | |  | |  | | | | | | | | |  |  | | |  | | |  |  | |
| Intercept | | **2077.11** | **147.22** | | **14.11** | | | | **2743.03** | | | | **223.86** | | **12.25** | | | | | **2077.33** | | **167.02** | | | **13.60** | | | | | **-0.41** | | | **0.21** | | | **-2.01** | | |  |  |  |
| Contextual Fit | | -7.69 | 86.26 | | 0.09 | | | | 309.05 | | | | 199.08 | | 1.55 | | | | | -33.61 | | 74.03 | | | -0.45 | | | | | **0.56** | | | **0.21** | | | **2.73** | | |  |  |  |
|  |

*Consequent region*

There were no significant effects found for the first pass reading times, first pass regressions out, regressions in or total reading time. However, there was an effect of Contextual Fit on regression path for the consequent region. This showed longer reading times for the conditional consequent when this had a lower goodness of fit with the context, relative to when there was a high goodness of fit between the conditional consequent and the context.

*Spillover region*

There were no significant effects found for the first pass, regression path or total reading time in the spillover region. However, there was an effect of Contextual Fit for the binomial first pass regressions out. This showed that there were more regressions out of the spillover region when the conditional consequent was a low explanatory goodness of fit for the context, relative to when it offered a good level of fit with the context.

**Appendix**

***1 High.*** Brian tells Mary that he thinks he heard that a nearby village has been flooded. The village is located near the sea side. However, it is also in a valley below a dammed reservoir. Mary remembers that the dam has been in a terribly bad state for some time. Mary thinks that if the village has been flooded, then the dam has broken. The dam was the responsibility of the local authority.

***1 Low.*** Brian tells Mary that he thinks he heard that a nearby village has been flooded. The village is located near the sea side. However, it is also in a valley below a dammed reservoir. Mary remembers that the dam has recently passed a safety inspection. Mary thinks that if the village has been flooded, then the dam has broken. The dam was the responsibility of the local authority.

***2 High.*** Whilst waiting for the train Judy looks for her iPod to listen to some music. It is not in her bag. Yet she is sure that she took it this morning. Then she sees that the bag has been cut open. Judy thinks that if her iPod is not in her bag, then someone has stolen it. At that moment there is an announcement that her train has been delayed.

***2 Low.*** Whilst waiting for the train Judy looks for her iPod to listen to some music. It is not in her bag. Yet she is sure that she took it this morning. There is no sign of the iPod in her bag although her iphone and everything else seems to be there. Judy thinks that if her iPod is not in her bag, then someone has stolen it. At that moment there is an announcement that her train has been delayed.

***3 High.*** Two friends of Pete are walking to Pete’s house. From a distance, it seems to them that there is a party going on in Pete's garden. They know that Pete is normally not a party-person. However, Pete had to play the finals of an important tennis tournament earlier today. They think that if there is a party, then Pete has won the match. Pete’s friends start to walk a little quicker to his house.

***3 Low.*** Two friends of Pete are walking to Pete’s house. From a distance, it seems to them that there is a party going on in Pete's garden. They know that Pete is normally not a party-person. However, as well as playing the finals of a tennis tournament earlier today it was also Pete’s partner’s 40th birthday today. They think that if there is a party, then Pete has won the match. Pete’s friends start to walk a little quicker to his house.

***4 High.*** Ben hears that Johnny has booked a flight to Australia. At the University, those that do best in their exams go on a summer exchange trip to a University in Australia. Ben knows that Johnny would really like to go to Australia. Johnny doesn’t know anyone in Australia but Ben believes that Johnny will pass his exams. Ben thinks that if Johnny is going to Australia, then he did well in his first year examination. Ben does not envy Johnny the long flight to Australia.

***4 Low.*** Ben hears that Johnny has booked a flight to Australia. At the University, those that do best in their exams go on a summer exchange trip to a University in Australia. Ben knows that Johnny would really like to go to Australia. Johnny has family in Australia who keep inviting him to visit but Ben strongly doubts that Johnny will pass his exams. Ben thinks that if Johnny is going to Australia, then he did well in his first year examination. Ben does not envy Johnny the long flight to Australia.

***5 High.*** In a museum archive, a historian has found letters that may have been written by Ludwig van Beethoven. The author of these letters has put some symbols in the margins. According to the historians studying the letters, these symbols are associated with the freemasons. In fact, in recent years several historians have uncovered independent evidence supporting the thought that Beethoven was a freemason. The historian thinks that if these letters are Beethoven’s, then he was definitely a freemason. The letters provide important evidence about the life of Beethoven.

***5 Low.*** In a museum archive, a historian has found letters that may have been written by Ludwig van Beethoven. The author of these letters has put some symbols in the margins. According to the historians studying the letters, these symbols are associated with the freemasons. However, some have also argued that Beethoven had good reason to pretend to be a freemason, given that most of his benefactors were freemasons. The historian thinks that if these letters are Beethoven’s, then he was definitely a freemason. The letters provide important evidence about the life of Beethoven.

***6 High.*** Lady Windemere has been murdered. Her sister had motive as she would inherit Lady Windemere's fortune of £5,000,000. Jeeves, the sister's butler, testified that the sister was home at the presumed time of the murder, but there were a couple of slight inconsistencies in his testimony, so the police are not sure they can trust him. Lady Windemere’s sister also badly needed the money and was known to have hated her sister. The police think that if the sister was at home at the time of the murder, then she committed the crime. The police were being pressured by the press to arrest someone soon.

***6 Low.*** Lady Windemere has been murdered. Her sister had motive as she would inherit Lady Windemere's fortune of £5,000,000. Jeeves, the sister's butler, testified that the sister was home at the presumed time of the murder, but there were a couple of slight inconsistencies in his testimony, so the police are not sure they can trust him. Lady Windemere’s sister also had her own fortune and so did not need the money and the sisters were known to have been very close. The police think that if the sister was at home at the time of the murder, then she committed the crime. The police were being pressured by the press to arrest someone soon.

***7 High.*** Debbie sees Mark pull up in a new car. His friend Debbie suspects his parents would buy him a car if he passed the recently held first year examination at college. Debbie doubts that Mark will have passed the first-year examination. She also knows Mark saved some money, but not enough buy a car himself. Debbie thinks that if Mark is driving a new car, then he passed the first-year examination. Mark does look good behind the wheel of the car though.

***7 Low.*** Debbie then sees Mark pull up in a new car. His friend Debbie suspects his parents would buy him a car if he passed the recently held first year examination at college. Debbie doubts that Mark will have passed the first-year examination. She also knows that Mark has recently received a large inheritance. Debbie thinks that if Mark is driving a new car, then he passed the first-year examination. Mark does look good behind the wheel of the car though.

***8 High.*** A friend tells you that she just saw Tom and Harry sharing a taxi. Tom and Harry have been friends for a number of years. However, you know that they recently had a flaming row which, you believe, ended their friendship for good. In particular, you don't expect them ever to spend time together. You think that if Tom and Harry are sharing a taxi, they have patched up their friendship. You think it would be nice if Tom and Harry could patch things up.

***8 Low.*** A friend tells you that she just saw Tom and Harry sharing a taxi. Tom and Harry have been friends for a number of years. However, you know that they recently had a flaming row which, you believe, ended their friendship for good. On the other hand, they still have common business interests, which they need to work together on in a professional manner. You think that if Tom and Harry are sharing a taxi, they have patched up their friendship. You think it would be nice if Tom and Harry could patch things up.

***9 High.*** Mary invited arch-enemies Betty and Chris to her party tonight. She heard Chris is coming to the party. Even though she knows that Chris likes to irritate Betty. He is not very close to Mary, and does not seem to be very fond of parties. Mary knows that if Chris comes to the party tonight, then he wants to irritate Betty. She is really hoping the party goes well tonight.

***9 Low.*** Mary invited arch-enemies Betty and Chris to her party tonight. She heard Chris is coming to the party. Even though she knows that Chris likes to irritate Betty. Chris is one of Mary's closest friends, and has always been fond of parties. Mary knows that if Chris comes to the party tonight, then he wants to irritate Betty. She is really hoping the party goes well tonight.

***10 High.*** A couple of years ago, John knew that the government took measures against the increasing pollution. Pollution has since decreased. John has been asked to consider whether the governments measures are responsible for this. You know that in recent years’ pollution levels in neighboring countries, which have taken no action, have significantly increased. You think that if there has been a decrease in pollution, then the measures taken by the government are responsible. You have to give your report to the government soon.

***10 Low.*** A couple of years ago, John knew that the government took measures against the increasing pollution. Pollution has since decreased. John has been asked to consider whether the governments measures are responsible for this. In recent years’ pollution levels in neighboring countries, which have taken no action, have also decreased. You think that if there has been a decrease in pollution, then the measures taken by the government are responsible. You have to give your report to the government soon.

***11 High.*** Ryan has spent the last six months fixing up a vintage Volkswagen Beetle. Earlier he lent the car to a friend who had promised to bring it back within the hour. His friend was now very late and Ryan thought the car may have broken down. Last week, he experienced some problems with the engine overheating. Ryan thinks that if the car is not returned within the hour, then the engine has overheated. Ryan really wanted the car to be okay so he could take it to a classic motor show later in the month.

***11 Low.*** Ryan has spent the last six months fixing up a vintage Volkswagen Beetle. Earlier he lent the car to a friend who had promised to bring it back within the hour. His friend was now very late and Ryan thought the car may have broken down. Last week, he experienced some reoccurring problems with the electrics and the starter motor. Ryan thinks that if the car is not returned within the hour, then the engine has overheated. Ryan really wanted the car to be okay so he could take it to a classic motor show later in the month.

***12 High.*** Chloe is a university lecturer. She is hoping to catch one of her colleagues to ask a quick question. From a distance it looks like his office door is closed. She knows that he always leaves his office door wide open when he is there. Chloe thinks that if his office door is closed, then he is not in the office. Chloe really needs to get a second opinion about some materials from her latest project.

***12 Low.*** Chloe is a university lecturer. She is hoping to catch one of her colleagues to ask a quick question. From a distance it looks like his office door is closed. She knows that he often keeps his office door closed due to the noise. Chloe thinks that if his office door is closed, then he is not in the office. Chloe really needs to get a second opinion about some materials from her latest project.

***13 High.*** Claire stayed late at work one dark Friday evening in the middle of winter. On her way home she decided to pop in and see her parents, but she wasn’t sure if they would be in. As she was driving past the end of the street she noticed that the lights were turned on. Claire knew they only had the lights were on when they were in to keep the electric bill down. Claire thinks that if the lights are on, then her parents are home. Claire hoped that her parents were in as it had been a while since she had seen them.

***13 Low.*** Claire stayed late at work one dark Friday evening in the middle of winter. On her way home she decided to pop in and see her parents, but she wasn’t sure if they would be in. As she was driving past the end of the street she noticed that the lights were turned on. Claire knew, however, that they had recently installed timer switches on the lights to deter burglars. Claire thinks that if the lights are on, then her parents are home. Claire hoped that her parents were in as it had been a while since she had seen them.

***14 High.*** Brian had to leave the FA cup final ten minutes before the end, in order to catch the last train home. He hated that he had to leave early like this. To make matters worse as he walked away from the stadium he heard what sounded like goal celebrations coming from inside the stadium. The scores were level when he left and his team looked the most likely to score a late winner. Brian thinks that if he can hear goal celebrations, then his team has scored. Brian really hoped the celebrations were for his team.

***14 Low.*** Brian had to leave the FA cup final ten minutes before the end, in order to catch the last train home. He hated that he had to leave early like this. To make matters worse as he walked away from the stadium he heard what sounded like goal celebrations coming from inside the stadium. The scores were level when he left and his team looked unlikely to score a late winner. Brian thinks that if he can hear goal celebrations, then his team has scored. Brian really hoped the celebrations were for his team.

***15 High.*** Paul was trying to make it to his parents’ house up in the mountains. It was a dark winter’s night and he noticed that the road to the village was closed. The area was known for heavy snowfall meaning the road was often closed. He had also listened to a weather forecast that morning predicting snow today. Paul thinks that if the road is closed, then there has been heavy snow fall. Paul wished his parents would move every time he made this journey.

***15 Low.*** Paul was trying to make it to his parents’ house up in the mountains. It was a dark winter’s night and he noticed that the road to the village was closed. The area was known for heavy snowfall meaning the road was often closed. However, he had listened to a weather forecast that morning predicting no snow would fall today. Paul thinks that if the road is closed, then there has been heavy snow fall. Paul wished his parents would move every time he made this journey.

***16 High.*** Colin was on his way to the pub. As he neared the pub he noticed his work colleague Ian sitting in the pub garden. He knew Ian was expecting news on a big promotion that day. Ian wasn’t a big drinker and had a reputation for only socialising on very special occasions. Colin thought if Ian is in the pub, then he’s got the promotion. Colin was looking forward for the chance to unwind as he had not been out in a while.

***16 Low.*** Colin was on his way to the pub. As he neared the pub he noticed his work colleague Ian sitting in the pub garden. He knew Ian was expecting news on a big promotion that day. Ian was a big drinker and had a reputation for always being out socialising whatever the occasion. Colin thought if Ian is in the pub, then he’s got the promotion. Colin was looking forward for the chance to unwind as he had not been out in a while.

***17 High.*** Lorna was getting ready for a high school house party that was due to start at “about 8pm”. She didn’t want to miss anything, but also didn’t want to be the first person there. As she walked towards the end of the street she could hear music coming from the house. She knew a friend’s rock band was due to play once the party started. Lorna thought if music can be heard coming from the house, then the party has started. Lorna had been looking forward to the party for a while.

***17 Low.*** Lorna was getting ready for a high school house party that was due to start at “about 8pm”. She didn’t want to miss anything, but also didn’t want to be the first person there. As she walked towards the end of the street she could hear music coming from the house. She knew a friend’s rock band was due to play, but they needed to sound check before the party started. Lorna thought if music can be heard coming from the house, then the party has started. Lorna had been looking forward to the party for a while.

***18 High.*** Annette shares an office with Ron. At the end of yesterday, as Annette was leaving the office, Ron was called into the manager’s office. The next Morning as Annette walked in to the office she could not see Ron in the office. She was concerned as yesterday Ron told her that he had a blazing argument with their manager. Annette thought that If Ron isn’t at work, then he’s been sacked. Annette enjoyed working with Ron in their office.

***18 Low.*** Annette shares an office with Ron. At the end of yesterday, as Annette was leaving the office, Ron was called into the manager’s office. The next Morning as Annette walked in to the office she could not see Ron in the office. She was not concerned that as yesterday Ron told her that he only had a minor disagreement with their manager. Annette thought that If Ron isn’t at work, then he’s been sacked. Annette enjoyed working with Ron in their office.