Be Prepared: The Effect of Expectations on Inattentional Blindness

Nika Adamian
Laboratoire Psychologie de la Perception, Université Paris Descartes, Paris, France

Maria Kuvaldina
St. Petersburg State University, St. Petersburg, Russia

Abstract. The influence of expectation on inattentional blindness (IB) was investigated using a lexical-based IB task. In two experiments, 235 participants performed word compilations from briefly presented letters and combinations of letters with an unexpected syllable appearing in one of the trials. In Experiment 1, we varied the frequency and grammatical form of the presented words, evaluating the role of "general" and "contextual" expectations. The results showed the effect of frequency but not of the grammatical form of the words. Experiment 2 controlled for the role of the state of completion of the word compilation in generating "contextual" expectations. We varied two factors: the state of completion of the word compilation during the onset of a new stimulus, and the role of the new stimulus in problem solving. Only the state of completion proved to be a significant factor for the occurrence of inattentional blindness.

Correspondence: Nika Adamian, nika.adamian@parisdescartes.fr, Université Paris Descartes, 45, Rue des Saints-Pères, 75006 Paris, France

Keywords: attention, inattentional blindness, expectations, context, relevancy

Acknowledgments. Preparation of the article is supported by the grant of President of Russia № MK-6068.2013.6 to Maria Kuvaldina. The authors would like to thank Maria Falikman for her inspirational comments on the design of the study and two anonymous reviewers for valuable input and suggestions.

Received 10 August 2014, accepted 18 September 2014.

Introduction

Inattentional blindness (IB) refers to the inability to notice a salient item when your attention is engaged in some other task, and is a good example of how our attention can depend on our expectations (Mack & Rock, 1998; Most et al., 2001; Most, Scholl, Clifford, & Simons, 2005; Koivisto & Revonsuo, 2006; White & Davies, 2008; Koivisto & Revonsuo, 2007; Most, 2013; Beanland & Pammer, 2010; Simons, 2010). Experimental procedures involving IB presume that the participant is only aware of the task that he or she is performing at the moment. A new item that appears during a single trial is not likely to be attributed to this task and hence not likely to be noticed.

Mack and Rock, in their seminal book (1998), tested whether IB can occur due to the irrelevancy (lack of expectations) of an extra item that is presented in the middle of an attention-demanding task. When there was no attention-demanding task, participants were able to perceive a new item even when they did not have any expectations about the time of its appearance (Mack & Rock, 1998, p. 205–206). In contrast, when participants did not know whether anything could change in the stimuli set, they tended not to notice extra items (Mack & Rock, 1998, p. 207). The authors concluded that IB could depend on the lack of expectations of "what" but not of "when".

A series of works by Most claimed that attention set (perceptual and/or semantic) is a key factor for IB (Most et al., 2001; Most et al., 2005). The earlier article showed that perceptual similarity of the extra item to the targets is an important factor that reduces IB levels up to six percent (Most et al., 2001, p. 12, Fig. 2). Although these data showed a clear influence of the perceptual relevance on IB level, it was not supported by experiments in which the extra item shared a similar color, both with targets and distractors (Koivisto & Revonsuo, 2006). It was also shown that strong sustained IB was present even when the extra item did not contain any of the colors included in the attended stimuli or distractors (Koivisto & Revonsuo, 2006).

Semantic set of attention also influences the level of IB. In another experiment by Koivisto and Revonsuo (2007), participants were shown four images or words representing pieces of furniture or animals. Participants were asked to recognize the objects. On the "critical" trial, an extra item that was either relevant or irrelevant to the current object recognition category appeared in the center of the display. It was found that despite the perceptual irrelevance (incongruence, such as a word among pictures or a picture among words), the semantic relevance (congruence) decreased IB level (Koivisto & Revonsuo, 2006). This result is supported by a study which varied the set of attention between two perceptually similar but conceptually different categories. Participants were more likely to notice an extra item when it belonged to the same category as the targets (Most, 2013).

White and Davies (2008) have shown that numerical expectations about the number of items presented in the main task can also influence IB level. If the number of items presented matched the expected amount of targets, the IB level was higher than in trials when the expected amount of targets was overestimated.

Previous knowledge about the phenomenon of IB does not seem to influence IB level if it is not given right before the experiment on IB (Beanland & Pammer, 2010; Simons, 2010). These two studies showed that general knowledge about IB and even previous experience with the same experimental paradigm (as in Simons, 2010) does not help participants to notice the extra item. Only those participants who were informed about the IB-inducing procedure right before the experiment were able to use this information to reduce the IB effect (Beanland & Pammer, 2010). Moreover, years of professional expertise also do not prevent IB, as shown by Drew, Võ, and Wolfe (2013).

Thus, IB clearly depends on the expectations of what will happen in the task, with semantic relevancy playing an even more important role than perceptual relevancy. However, different types of expectations were never tested within the same experimental paradigm. The present study aimed to evaluate the contribution of various types of expectations to IB. Experiment 1 tested the role of "general" expectations (the probability of an event) and "contextual" expectations (probability of an event in the given context) raised by the task performed. Experiment 2 tested whether the strength of "contextual" expectations corresponds to the completeness of the task at hand. We used lexical stimuli to ease the manipulation of expectations. In addition, we tested two types of IB measurement: verbal report and usage of the extra item in the main task.

Experiment 1

Previous studies have used lexical material to increase the familiarity of stimuli (as in Mack & Rock, 1998) or to bind images and pictures with the same meaning (as in Koivisto & Revonsuo, 2006). We used a scrambled words task in order to manipulate different types of expectations: how frequent the word is in the Russian National Corpus, and how a solution is grammatically apparent in a given context. The task of unscrambling a word made it possible to present extra letters (equivalent to the extra item or "critical stimulus" in the previous studies of IB), which could either be included in the response or omitted. This procedure provided us with an extra measurement of IB: apart from the verbal report on whether the participant had noticed the extra item, we could also assess whether the extra item was included in the solution.

In the first experiment, we tested whether the corpus frequency and grammatical form of words modulate the levels of IB towards the parts of these words. We assumed that corpus frequency represents "general knowledge" of the likelihood of the word being seen or used. Conversely, grammatical form is defined by the context in which the word is used. When solving the lexical task, it is natural to expect a word in its dictionary form (nominative case singular). Thus, we used low corpus frequency and altered grammatical forms in order to test whether violation of participants' expectations leads to a change in the probability of noticing new stimuli. Additionally, we aimed to compare the sensitivity of the proposed IB measurements (verbal report and usage of the extra letters).

Method

132 Russian-speaking students at St. Petersburg State University volunteered for participation in the study (94 female, 16 – 39 years old, M = 23). All of them were self-reported native speakers of Russian. Participants were randomly assigned to one of the three conditions. The experiment was run as a between-subject design.

Stimuli

We chose the paradigm used in Mack and Rock's (1998) research as a framework for our experimental design. In Mack and Rock's procedure, participants were given the task of discriminating between longer and shorter arms of a cross presented foveally for 200 ms. The image of the cross was masked for 1500 ms before the next trial proceeded. After several practice trials, a "critical" trial started when a small black item was presented in one of the quadrants of the cross within 2.3° from the fixation point. After the "critical" trial, the participant was asked to report not only which of the arms of the cross was longer but also whether there was something else present besides the cross. For the purposes of the present study, we kept timing and spatial characteristics of presentation the same but changed the stimuli sets. Instead of the cross we presented a scrambled word, consisting of several syllables in black text. The task was to unscramble the word and write it down after each trial. The extra item was a syllable of a light grey color that could either be added to the word or left unused. We labeled a word that could be composed

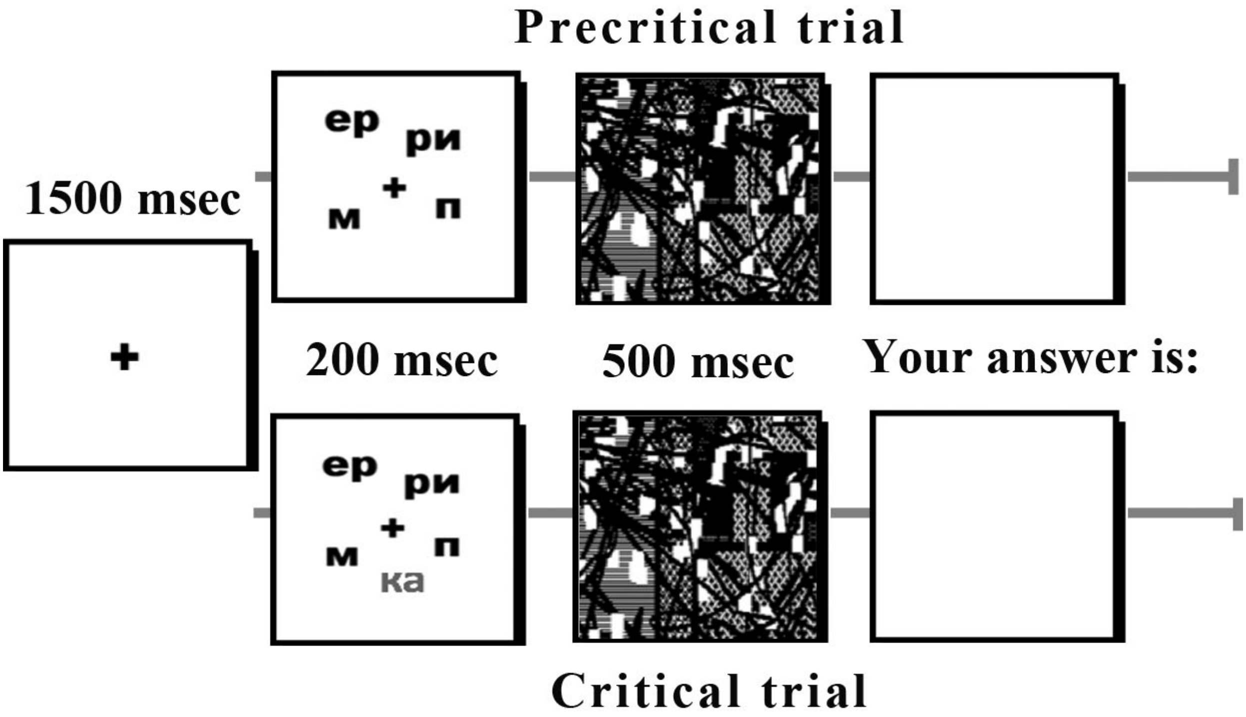

Figure 1. Order of trial events in Experiment 1. Each trial started with a fixation cross presented for 1500 ms. Black letters (in "precritical" trials) or the same black letters with the extra grey syllable (in the "critical" trial) appeared for 200 ms. Then the image was masked and the response window appeared. The next trial started immediately after the response.

out of scrambled black syllables «Word 1» and a word that could be composed out of syllables in both black and grey print «Word 2».

There were three experimental groups. Each group was presented with the same word for the main task (Word 1). The factor that varied across groups was the extra syllable ("critical stimulus") presented on the last, "critical" trial. This additional syllable allowed the transformation of Word 1 into Word 2. Word 2 could be a low frequency word (violation of "general" expectations), a word in genitive case plural (violation of "contextual" expectations) or a word in the dictionary form matched to Word 1 in terms of frequency (baseline condition). Altogether, each participant completed four "precritical" trials during which only Word 1 was presented in the scrambled form, followed by one "critical" trial, in which the extra syllable was added allowing Word 2 to be composed.

Word 1 in all the conditions was the Russian word "ПРИМЕР" (meaning "example"). In the baseline condition, the additional syllable "НО" transformed it into Word 2 "ПРИМЕРНО" ("approximately"). The low-frequency Word 2 that was used for another condition was "ПРИМЕРКА" ("fitting"). According to the New Frequency Vocabulary of Russian Words (Lyashevskaya & Sharov, 2008), Word 1 ("ПРИМЕР") has a frequency of about 87.39 instances per million (ipm), baseline Word 2 ("ПРИМЕРНО") has a frequency of 95.64 ipm, and the low-frequency Word 2 ("ПРИМЕРКА") occurs 1.75 ipm. Thus, the latter word is used considerably less by native Russian speakers.

Lastly, the word "ПРИМЕРОВ" could be composed from the syllables in the third group. The extra syllable "ОВ" made Word 2 no less frequent than Word 1 "ПРИМЕР". Essentially, it is the same word in genitive case plural. However, the solution became contextually unexpected, as it is usual for solutions to word games, such as crosswords or anagrams, to be words in nominative case.[1]

Procedure

The sequence of trial events is described in Figure 1. Each trial started with a fixation cross presented for 1500 ms. Participants were instructed to maintain fixation throughout the trial. Syllables in black letters 0.2° wide and 0.3° high were presented for 200 ms. They were randomly distributed across the display within 4° around the fixation point, but their positions and identity did not change from trial to trial. After that, a pattern mask covered the whole display for 500 ms followed by the response window. The participants were asked to respond by typing in a word they could assemble from the presented letters. There was no time limit for the response. The participants were advised that a correct answer could be any Russian word regardless of the part of speech, and that the same word could be presented twice or more. In the absence of a confident response, participants were encouraged to enter their best guess. Four trials with only black letters ("precritical" trials, in which Word 1 was presented) were followed by the "critical" trial, in which the extra item unexpectedly appeared. It was a medium-grey syllable that was presented at a distance 3.6° from the fixation point. After the "critical" trial, participants were asked if they noticed any stimuli that were in some way different from the majority of the stimuli presented.

[1] In English, a similar example could be given if we assume that the main word was "CORN". The first group could add the syllable "ER" and thus compose the task-congruent and highly frequent word "CORNER". The second group could add the syllable "EA" to make the word "CORNEA", a low-frequency but still task-congruent word. The third group could compose the word "CORNED" with the help of the extra syllable "ED", which makes the task incongruent (unusual for the lexical task).

The experiment was presented on a Sony VAIO laptop using Superlab 4.0 software (Cedrus, Phoenix, Arizona) under Windows 7. Stimuli were presented against a white background. Participants were seated at the distance of 50 cm from a 13.5” monitor with 60 Hz refresh rate. Each participant performed five trials: four trials with Word 1 and one “critical” trial with Word 2.

We considered those participants who did not use the extra syllable and did not report to have noticed it to be inattentionally blind. However, failure to notice the new syllable in the “critical” trial could only be considered inattentional blindness if all the other letters had been seen in the “precritical” trials. Hence, the results of the participants who failed to solve the anagram before the extra syllable appeared were excluded from analysis.

Planned analyses included the comparison of the IB levels in low frequency group and the grammatical form change group to the baseline, in order to evaluate the role of “general” and “contextual” expectations, respectively, on the probability of noticing the additional stimulus. Besides this, we were interested in deciding whether the use of the extra item in the response could be used as an online measure of IB. We aimed to compare IB rates measured by the conventional criterion (verbal report) and by the new criterion. If the new criterion proved to be as sensitive as the conventional criterion, it could complement the existing IB procedure and allow us to collect more data per participant, since using the extra item in the response, unlike verbal report, does not necessarily lead to any “division of attention”.

Results

Data analyses comprised chi-square tests. The results of the experiment are presented in Table 1. Data of 57 participants were excluded from the analysis as they failed to solve Word 1. The high drop-off rate is a problem of the current design and it was addressed in Experiment 2. However, this drop-off was equally high in all three groups. The data of 44 participants per condition were collected, resulting after the exclusion in sample sizes of 22, 28, and 25 participants in the low frequency, baseline and grammar form change groups, respectively. The majority of these participants (44%) first entered the correct answer on the last “precritical” trial, and this tendency did not differ across the three groups. As the exclusion criteria were set before the start of data analysis and the sample size after exclusion was big enough according to the statistical power tests, we carried on with the analysis of the current dataset.

Condition	Non-noticers (verbal report)	Non-noticers (response in the last trial)	Sample size (after exclusion)
Low frequency	17 (77.2%)	11 (50%)	22
Baseline	7 (23%)	13 (46.4%)	28
Grammatical form change	13 (52%)	11 (44%)	25

Table 1. **The results of Experiment 1. Percentage of non-noticers across conditions (measured by verbal report and by using the extra item in the response).**

First, we carried out the planned analyses using the conventional IB criterion – verbal report. On average, the procedure induced IB in 50.6% of participants. In the baseline condition, only 23% of participants were inattentionally blind. In the low frequency group, 77.2% of participants were affected. The difference reached statistical significance and the effect size was large ($\chi^2(1) = 13.49$, $n = 50$, $p < .0001$, $phi = .52$), suggesting that word frequency is an important predictor of IB in the current task. In the grammatical form change group, 52% of participants were considered inattentionally blind, compared to 77.2% in the baseline condition. However, this trend was not statistically significant ($\chi^2(1) = 4.1$, $n = 53$, $p = .053$). Thus, no considerable effect of grammatical form was detected.

Next we tested whether the same pattern of results was obtained using the response in the last trial as an IB criterion. The differences between the groups turned out not to be statistically significant ($\chi^2(2) = 0.17$, $n = 75$, $p = .1$), suggesting that the new criterion was not as sensitive as the conventional one.

The results of Experiment 1 showed that corpus frequency (“general” expectation factor) but not the expectedness of the particular grammatical form (“contextual” expectation factor) predicted IB rate. One possible explanation for the latter result is that the procedure we used always implied unscrambling Word 1 prior to the “critical” trial. White and Davies (2008) showed that fulfilment of expectations regarding the number of items on the screen triggers IB. Simons (2010) also suggested that the phenomenon of “satisfaction of search” (Fleck et al., 2010) can be related to IB. Similarly, in our results the predicted decrease in IB rate due to narrowed “contextual” expectations might have been overridden by the fact that the main task is solved and no further stimulation is expected. Experiment 2 tested this assumption by using pseudowords alongside real words in the lexical IB task.

Experiment 2

Experiment 2 aimed to further explore the potential sources of expectations in the IB task. Based on the results obtained in Experiment 1, we hypothesized that regardless of the relevance of the extra item (i.e., whether it might possibly be used to solve the task at hand), the mere state of having or not having solved the task generates expectations about the forthcoming stimulation (i.e., whether more information is needed to solve the task). Thus, as soon as the task is solved (or considered to be solved), no more stimuli are expected, and the probability of IB towards any stimulus is high. Alternatively, if the task is not yet solved, expectations are not yet fulfilled and new stimuli are likely to be noticed.

We attempted to simulate this process using real words and pseudowords as Word 1. The task of unscrambling a real word always has a solution, whereas in the case of a pseudoword the task is impossible to solve. We assumed that an attempt to unscramble a pseudoword would yield stronger expectations of new stimuli than the successful unscrambling of a real word. Since these expectations are not specific to the stimuli and are generated merely by the process of solving the task, we call them “expectations driven by the task”. We also manipulated the relevance of the extra item by making Word 2 either a word or a pseudoword, so that the extra item could or could not be used to solve the task. Since in this case the identity of letters in Word 1 was important for generating expectations, we called this factor “expectations driven by the stimuli”. Additionally, in order to obtain the baseline IB level in the absence of expectations discussed above, we designed a control task, in which digits were presented as Word 1 and letters were used as extra items. In this case, no expectations towards letters could possibly be generated, as the participants were engaged in the task of merely identifying digits. We used this control condition to evaluate the role of “general context”.

Method

180 Russian-speaking students at Saint Petersburg State University (123 female, 17-36 years old, M = 22) participated in the experiment in exchange for a monetary reward or course credit). All of them were self-reported native speakers of Russian. The experiment was run as a between-subjects design.

Stimuli

There were five conditions to which participants were randomly assigned. In groups 1 through 4, we varied the possibility of composing the whole word during “precritical“ trials (when only black letters are presented) and the possibility of composing the word in the “critical” trial using two extra letters. It was considered possible to unscramble the word (either Word 1 or Word 2) if the stimulus consisted of a real word, and it was impossible to unscramble the word if the stimulus was made of a pseudoword. Thus, with the addition of an extra syllable, the task could either change its solvability (word-to-pseudoword or vice versa) or maintain it (word-to-word, pseudoword-to-pseudoword). This extra syllable was the same for all five groups.[1] The scheme of the experiment (with English analogues of Russian words used) is shown in Figure 2. The last group accomplished a control task: they were presented with an array of digits instead of Word 1. They were presented with the same syllable on a “critical” trial as the other groups, but instead of solving the lexical task they performed identification of the stimuli presented. Thus, contrary to the other groups, they were not expecting a letter stimulus at all.

Procedure

Trial events remained the same as in Experiment 1. The only difference was that we omitted the mask in order to make Word 1 easier to unscramble and decrease the drop-off rate. For the same purpose, we introduced practice trials. During practice, participants were presented with scrambled words or pseudowords. Practice words and pseudowords were three to six letters long and did not share any letters

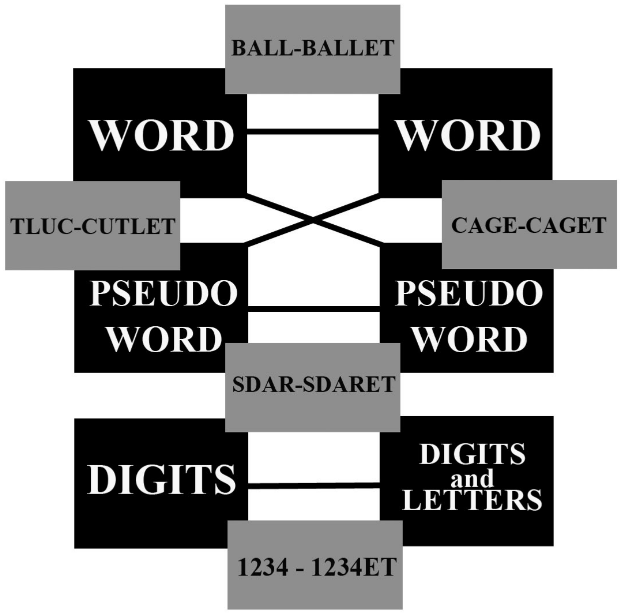

Figure 2. Conditions used in Experiment 2. Figure should be read clockwise starting with the top left corner. Black boxes represent types of Word 1 and Word 2; lines represent conditions. Example stimuli are given in grey boxes on top of the relevant black boxes.

with Word 1 or Word 2. In order not to create any expectations regarding the number of repetitions of stimuli, we presented the same practice stimuli in one to four consecutive trials. The practice stage consisted of 13 trials and was followed by three “precritical” trials and one “critical” trial when the extra syllable was presented. The participants were not aware of the structure of the experiment. Each participant performed 17 trials in total.

The task for the participants in groups 1 through 4 was exactly the same as in Experiment 1. Participants assigned to group 5 were asked to report all the stimuli they saw in no particular order.

Verbal report was used to judge whether participants were inattentionally blind.

Results

Data from 20 participants were excluded from the analysis because they failed to unscramble Word 1. In the groups where Word 1 was a pseudoword or a set of digits, we excluded the data of those participants who failed to report all the symbols of Word 1 in any order. As in Experiment 1, the drop-off rate and performance in “precritical” trials were uniform across groups. Data from 36 participants per group were collected, resulting in group sizes of 31 to 33 participants at the analysis stage (see Table 2 for exact group sizes after exclusion). Word 1 was entered correctly for the first time in the “precritical” trial number 3 by 52% of participants.

The experiment aimed to ascertain the effect of i) expectations driven by the task (having solved the task before the “critical” trial), ii) expectations driven by stimuli (being able to solve the task using the extra item), and iii) overall context (type of stimuli) on IB rate. The results of the experiment are shown in Table 2. As predicted, the highest IB rate was reached in the control condition with the digit identification task (88%). The lowest IB rate was obtained in the condition where both Word 1 and Word 2 were pseudowords (45%).

[1] The first group was presented with a word “КОФЕ” that could be changed to a word “КОФЕИН”. The second group was presented with a word “СЛОЙ” that could be changed to a non-word “СЛОЙИН”. The third group was presented with a non-word “ЛОВР” that could be changed to a non-word “ЛОВРИН”. The fourth group was presented with a non-word “КУВШ” that could be changed to a word “КУВШИН”.

Condition (Word1→Word2)	Percentage of non-noticers	Sample size (after exclusion)
Word→Word	64%	32
Word→Pseudoword	48%	32
Pseudoword→Word	51%	33
Pseudoword→Pseudoword	45%	31
Digits→Digits and Letters	88%	32

Table 2. **The results of Experiment 2. Percentage of non-noticers across conditions (measured by verbal report).**

In order to assess the role of different kinds of expectations, we performed a binary logistic regression entering three factors into the model: expectations driven by the task, expectations driven by the model and general context. We constructed these factors according to the type of Word 1 and Word 2 presented in each of the conditions. If Word 1 was an unsolvable pseudoword, we assumed that it generated "expectations driven by the task". If Word 2 was a real word, we assumed that "expectations driven by the stimuli" were generated. Finally, if Word 1 was composed of letters as opposed to digits, we assumed that "general context" was created. The model with three factors was statistically significant ($\chi^2(3) = 19.34$, $p < .001$) but explained only 16% of the variance in the data (Nagelkerke R^2), so overall the factors accounted for a modest amount of variation. However, the model correctly classified 64.4% of cases. Expectations driven by the task and overall context added statistical significance to the prediction (Wald(1) = 0.86, $p = .033$ and Wald(1) = – 2, $p = .001$ respectively). However, expectations driven by stimuli did not contribute significantly to the model (Wald(1) = – 0.07, $p = .86$). In summary, the results showed that fulfilment of expectations about the task before the extra item appears indeed increases IB rates.

Discussion

The aim of the study was to test the effects of different types of expectations on IB. We developed a novel experimental paradigm ("lexical" IB), which enabled us to introduce the manipulation of expectations into a recognition task and to get insight on how such expectations are formed. The results of Experiment 1 demonstrate that IB can be successfully observed in such a task. Furthermore, data showed that a word frequency effect, commonly mentioned in linguistics studies (see Monsell, 1991, for a review), is also present in the previously untested domain of IB. Experiment 2 further extended the results of Experiment 1, showing that the impact of context on IB crucially depends on whether the main task is considered solved, but less so on the immediate relevance of the "critical" item.

There were two criteria of IB used in the experiment: a conventional one which implies that the participant has at least perceived the extra item, and another that implies the usage of the extra item in the main task performance. The new criteria proved to be inefficient in the word scrambling task. It could be due to the difference in representations needed to fulfill the two criteria. The verbal report on the extra item requires some vague perception of an extra item. Simons (2007) mentions that despite the saliency of the item (i.e., a man in a gorilla suit) "…observers might have had some awareness of the gorilla, or they might have had momentary awareness of some furry object, even if they failed to report noticing anything unusual." (Simons et al., 2007, p. 213). The usage of the extra item in the task of unscrambling words actually requires at least some control over the process of anagram solving (unscrambling) and an ability to switch between versions of the task solution in favor of the one that includes the extra item. Control over performance happened to be less sensitive to expectation manipulations in comparison with the gist of the stimuli set with the extra item. We nonetheless believe that it would be possible to use online measures for IB in other tasks. It will help to run larger studies using fewer participants to gain insight into the interplay between attention and awareness.

The interplay between attention and expectation is a much debated topic. As stated by Summerfield and Egner (2014), "expectation" is a statistical probability of a sensory event, whereas "attention" is its motivational relevance. The majority of previous IB studies manipulated "attention set" (e.g., perceptual similarity of main and "critical" objects) but did not consider probability effects. In fact, there is no straightforward way to study these effects, largely because IB can only be detected once per participant. Our paradigm could be considered a possible way to study probability effects on IB through manipulating the probability of the stimuli occurring together ("general" expectation factor, or word frequency effect) and the probability of a search for additional stimuli ("contextual" expectation factor, or task solving effect). Interestingly, when probability (expectation) and attention (relevance) were manipulated orthogonally, we did not find strong enough evidence for the contribution of relevance, which is not in line with previously reported effects. One possible explanation for this inconsistency is that our task posed extreme demands on processing capacities of the visual system. This was necessary for the expectation effect to emerge, but it may as well complicate attention-related processes. Furthermore, we did not aim to study attention set for lexical stimuli, which may be considerably different from attention set for perceptual features extensively described in the IB literature.

The present study was largely inspired by experiments on numerical expectations in IB. White and Davies (2008) proposed that by using numerical expectations, the participant "makes decision as to whether the processing is complete". However, numerical expectations seem to be of an artificial nature. We do not normally count objects in our visual field and neither are we prompted regarding their number. Experiment 2 is based on a similar idea – that having solved the task, participants decide that processing is complete – however, it uses a much more ecological situation. The results of Experiment 2 are in line with the results on numerical expectations. It is thus possible that the participants' decision to terminate processing could be elicited by a much more complicated evaluation than a simple match between the number of expected and presented stimuli.

Conclusion

Our study aimed to elucidate the role of various types of expectations by comparing their influence on the probability of IB. The results showed that fulfilment of expectations about the task indeed increases IB rates. The present study is not the first to find that we are sensitive to expectations and their violations, even if attention is diverted elsewhere (see Summerfield & Egner, 2014 for a review). Our findings, though, show that whether or not a new, unexpected stimulus will be noticed depends more on the need for more information than on the motivation to find a particular stimulus. As such, when you are presented with an IB task, be aware that it will not only be about your attention.

References

Beanland, V., & Pammer, K. (2010). Gorilla watching: Effects of exposure and expectations on inattentional blindness. In *ASCS09: Proceedings of the 9th Conference of the Australasian Society for Cognitive Science* (pp. 12–20).

Drew, T., Võ, M. L. H., & Wolfe, J. M. (2013). The invisible gorilla strikes again sustained inattentional blindness in expert observers. *Psychological Science*, *24*(9), 1848–1853. doi: 10.1177/0956797613479386

Fleck, M. S, Samei, E., Mitroff, S. R. (2010). Generalized "satisfaction of search": Adverse influences on dual-target search accuracy. *Journal of Experimental Psychology Applied, 16,* 60–71. doi: 10.1037/a0018629

Koivisto, M., & Revonsuo, A. (2007). How meaning shapes seeing. *Psychological Science*, *18*(10), 845–849. doi: 10.1111/j.1467-9280.2007.01989.x

Koivisto, M., & Revonsuo, A. (2008). The role of unattended distractors in sustained inattentional blindness. *Psychological Research*, *72*(1), 39–48. doi: 10.1007/s00426-006-0072-4

Lyashevskaya, O., & Sharov, S. (2009). *The frequency dictionary of modern Russian language*. Moscow: Azbukovnik.

Mack, A., & Rock, I. (1998). *Inattentional blindness*. Cambridge, MA: The MIT Press.

Monsell, S. (1991). The nature and locus of word frequency effects in reading. In D. Besner & G. W. Humphreys (Eds.), *Basic processes in reading: Visual word recognition*. Hillsdale, NJ: Erlbaum (pp. 148–197).

Most, S. B. (2013). Setting sights higher: category-level attentional set modulates sustained inattentional blindness. *Psychological research*, *77*(2), 139–146. doi: 10.1007/s00426-011-0379-7

Most, S. B., Scholl, B. J., Clifford, E. R., & Simons, D. J. (2005). What you see is what you set: sustained inattentional blindness and the capture of awareness. *Psychological review*, *112*(1), 217–242. doi: 10.1037/0033-295X.112.1.217

Most, S. B., Simons, D. J., Scholl, B. J., Jimenez, R., Clifford, E., & Chabris, C. F. (2001). How not to be seen: The contribution of similarity and selective ignoring to sustained inattentional blindness. *Psychological Science*, *12*(1), 9–17. doi: 10.1111/1467-9280.00303

Simons, D. J. (2010). Monkeying around with the gorillas in our midst: familiarity with an inattentional-blindness task does not improve the detection of unexpected events. *i-Perception*, *1*(1), 3–6. doi: 10.1068/i0386

Simons, D. J., Hannula, D. E., Warren, D. E., & Day, S. W. (2007). Behavioral, neuroimaging and neuropsychological approaches to implicit perception. *The Cambridge handbook of consciousness* (pp. 207–250). doi: 10.1017/CBO9780511816789.010

Summerfield, C. & Egner, T. (2014). Attention and decision-making. In A.C. Nobre & S. Kastner (Eds.), *The Oxford Handbook of Attention*. Oxford University Press (chapter 29, pp.837–864). doi:10.1093/oxfordhb/9780199675111.013.018

White, R. C., & Davies, A. A. (2008). Attention set for number: expectation and perceptual load in inattentional blindness. *Journal of Experimental Psychology: Human Perception and Performance*, *34*(5), 1092–1107. doi: 10.1037/0096-1523.34.5.1092

Будь готов: влияние ожидания на слепоту по невниманию

Ника Адамян
Университет Париж Декарт, Париж, Франция

Мария Кувалдина
Санкт-Петербургский государственный университет, Санкт-Петербург, Россия

Аннотация. Влияние фактора ожидания на слепоту по невниманию (СН) исследовалось с помощью лексической задачи, вызывающей СН. Испытуемые составляли слова из предъявленных на короткое время буквосочетаний, часто не замечая, что в одной из проб появлялся новый, отличающийся от других стимул. Было проведено два эксперимента, общая выборка составила 235 человек. В Эксперименте 1 исследовалась роль «генерализованных» и «контекстных» ожиданий путем варьирования частотности и грамматической формы предъявляемых слов. Эксперимент 2 был проведен для контроля влияния степени завершенности составления слова на формирование «контекстных» ожиданий. Оценивалась роль двух факторов: степени завершенности составления слова в момент появления нового стимула и релевантности нового стимула текущей задаче. Лишь первый фактор оказался значимым предиктором СН.

Контактная информация: Ника Адамян, nika.adamian@parisdescartes.fr, Université Paris Descartes, 45, Rue des Saints-Pères, 75006 Paris, France.

Ключевые слова: внимание, слепота по невниманию, ожидания, контекст, релевантность.

Благодарности. Статья написана при поддержке гранта Президента России № МК-6068.2013.6. Авторы выражают глубокую благодарность М. В. Фаликман за важный вклад в планирование исследования и рецензентам за комментарии к черновикам статьи.

Статья поступила в редакцию 10 августа 2014 г. Принята в печать 18 сентября 2014 г.

Литература

Ляшевская О. Н., Шаров С. А. Новый частотный словарь русской лексики. М.: Азбуковник, 2009.

Beanland V., Pammer K. Gorilla watching: Effects of exposure and expectations on inattentional blindness // ASCS09: Proceedings of the 9th Conference of the Australasian Society for Cognitive Science. 2010. P. 12–20.

Drew T., Võ M.L.H., Wolfe J.M. The Invisible gorilla strikes again sustained inattentional blindness in expert observers // Psychological Science. 2013. Vol. 24. N 9. P. 1848–1853. doi: 10.1177/0956797613479386

Fleck M. S, Samei E., Mitroff S. R. Generalized “satisfaction of search”: Adverse influences on dual-target search accuracy // Journal of Experimental Psychology Applied. 2010. Vol. 16. P. 60–71. doi: 10.1037/a0018629

Koivisto M., Revonsuo A. How meaning shapes seeing // Psychological Science. 2007. Vol. 18. N 10. P. 845–849. doi: 10.1111/j.1467-9280.2007.01989.x

Koivisto M., Revonsuo A. The role of unattended distractors in sustained inattentional blindness // Psychological Research. 2008. Vol. 72. N 1. P. 39–48. doi: 10.1007/s00426-006-0072-4

Mack A., Rock I. Inattentional blindness. Cambridge, MA: The MIT Press, 1998.

Monsell S. The nature and locus of word frequency effects in reading // D. Besner & G.W. Humphreys (Eds.), Basic processes in reading: Visual word recognition. Hillsdale, NJ: Erlbaum, 1991. P. 148–197.

Most S. B. Setting sights higher: category-level attentional set modulates sustained inattentional blindness // Psychological research. 2013. Vol. 77. N 2. P. 139–146. doi: 10.1007/s00426-011-0379-7

Most S. B., Scholl B. J., Clifford E. R., Simons D. J. What you see is what you set: sustained inattentional blindness and the capture of awareness // Psychological review. 2005. Vol. 112. N 1. P. 217–242. doi: 10.1037/0033-295X.112.1.217

Most S. B., Simons D. J., Scholl B. J., Jimenez R., Clifford E., Chabris C. F. How not to be seen: The contribution of similarity and selective ignoring to sustained inattentional blindness // Psychological Science. 2001. Vol. 12. N 1. P. 9–17. doi: 10.1111/1467-9280.00303

Simons D.J. Monkeying around with the gorillas in our midst: familiarity with an inattentional-blindness task does not improve the detection of unexpected events // i-Perception. 2010. Vol. 1. N 1. P. 3–6. doi: 10.1068/i0386

Simons D.J., Hannula D.E., Warren D.E., Day S.W. Behavioral, neuroimaging and neuropsychological approaches to implicit perception // The Cambridge handbook of consciousness. 2007. P. 207–250. doi: 10.1017/CBO9780511816789.010

Summerfield C., Egner T. Attention and decision-making // A.C. Nobre, S. Kastner (Eds.), The Oxford Handbook of Attention. Oxford University Press, 2014. Chapter 29, p. 837–864. doi: 10.1093/oxfordhb/9780199675111.013.018

White R.C., Davies A.A. Attention set for number: expectation and perceptual load in inattentional blindness // Journal of Experimental Psychology: Human Perception and Performance. 2008. Vol. 34. N 5. P. 1092–1107. doi: 10.1037/0096-1523.34.5.1092