

Do Mnemonic devices help reader read faster and better? Observation from the horizontal acceleration data within specific line sections.

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Abstract

In my pilot study, I focus on finding out if there are any evidence that mnemonic devices (abbreviated as m-devices) can help achieve better reading efficiency. Here we define better reading efficiency as "less regression", faster reading pace, and better retention (comprehension) after reading. We will have two groups of participants reading the passage, and measure the fixation and time stamps to see the total time used. I will also analyze the time used after passing the circled area (main verb)

Introduction & literature review

I have been interesting in synesthesia for sometime, since I am a synesthesics of Part of speech / syntax and tactile feeling. I met some dyslexics throughout my life and I started to wonder if my special perception on reading would help them read better? From the paper I read this semester, I realize that the dyslexics have problem in crowded text. For these people, I expect my m-devices would help them focus on the main part of the sentences, that is, the predicates. I wish to see the acceleration after the main verb or velocity higher than average in the predicate ROIs.

Methods

This is the initial plot comparison.

<http://fall-cicada.blogspot.tw/2015/12/dot-map-comparison.html> But we can't see any concluding result from them directly. So we compute the velocity within certain dot-line sections, that is, we specifically looking for the sections in our ROIs. If we found the velocity increases after passing the main verb ROIs, then our assumption is correct. We do the velocity - fixation map after to figure out the velocity in each neighboring dot-line section. I also mark ROIs and m-devices in most of the main verbs and predicates of the test material.

The material is chosen from the novel "metro 2033", written by a Russian novelist. It's a crucial step to choose suitable materials. I am measuring the the reading efficiency by time stamp and positive velocity changing (I figure out fixation numbers is not an adequate index for reading efficiency). I would need a passage with suitable syntactic structure. To briefly explain my desired "pattern" on the passage, I would reinforce the elements we are looking for: the SVO structure, or the "main verb-predicate" structure.

I must find a passage with many SVO structure, but it cannot be too complicated or with too many dangling sentences. It shall not be too boring to read with, it's better with some scene or plot description to stimulate the reader to go on with a comfortable pace. The passage I chose fit my requirement. But after the test I was told by the participants that the passage is very boring. This is beyond my expectation. I thought I chose the right material for the readers.

I was advised by Zuzana that I shall tell the participants we will ask them the content of the passage. So they will read the material carefully.

The next step, we try to compute the data obtained with two relative easy concepts: velocity and acceleration. Measuring reading efficiency is a hard task, but we can count on the x position and the time stamps of each dot (fixation). Here's the simple formula we learned from basic Physics.

$$v = \Delta x / \Delta t$$

$$a = \Delta v / \Delta t$$

The concept is simple: we assume reader will read slower when there're hard words or content in need of more attentional resource. For any given Δx , we can compute the velocity within the two neighboring dots. We will compare the velocity within the ROIs.

Anticipating results:

I assume that the velocity within the main verb ROIs and predicate ROIs will be faster. The velocity outside these ROIs will be slower. What's more, I assume the velocity in predicate ROIs will be even faster than those in main verb areas. So the slope (acceleration) of velocity-fixation map would be positive and sharper. To see the result, we map the velocity to dot x map. There are some obvious peaks and increasing speed in certain area, and they often appear repeatedly. All we need to do is to see if these areas were in the predicate ROIs. If the slope ratio = positive, that means the acceleration is positive and the velocity is increasing rapidly.

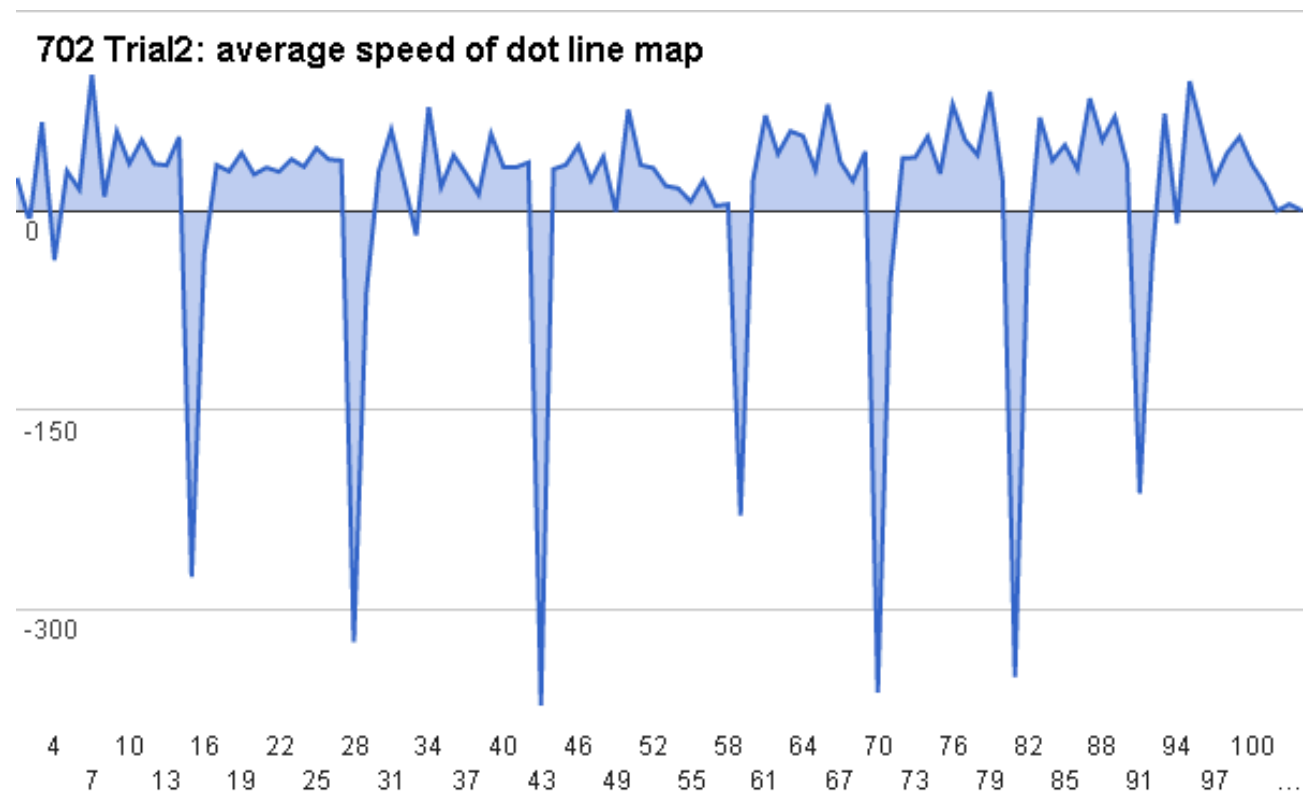
Results and analysis

Here's a piece of the result from the trial 2 and 3 of two participants. The huge negative peaks represent line changing (a huge regression actually). We will ignore them here. The pattern in trial 2 for both participants is quite similar. But for trial 3, there're more fixation for participant 702. There're also more deceleration and

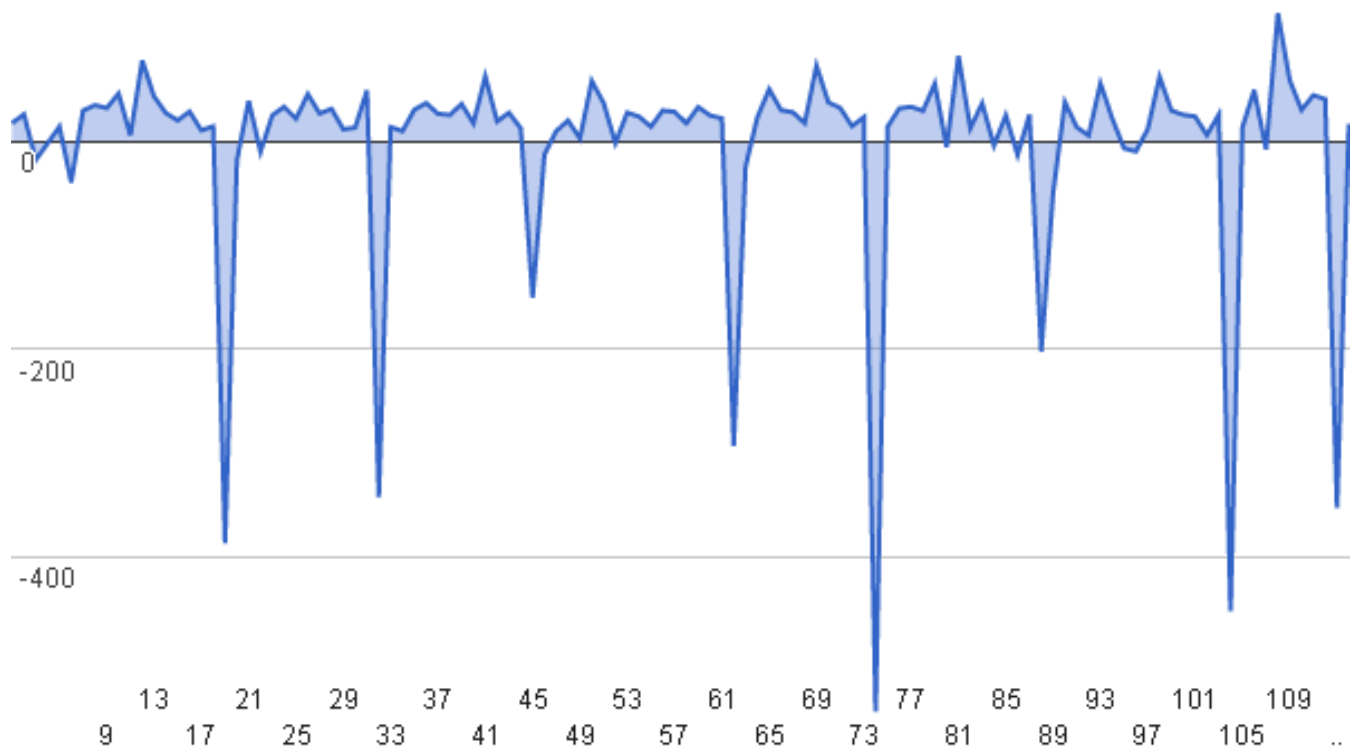
small negative peaks, these are the regressions for meaning certification. So for these two participants, m-devices surely have the effect on outlining the points of each sentences, that is, the predicates. We can not ignore the fact that we need more participants and a balanced matrix for experiment, but the methodology is similar. We will try a more complete test in my research proposal.

For more detailed ROI and acceleration data, please check the link below.

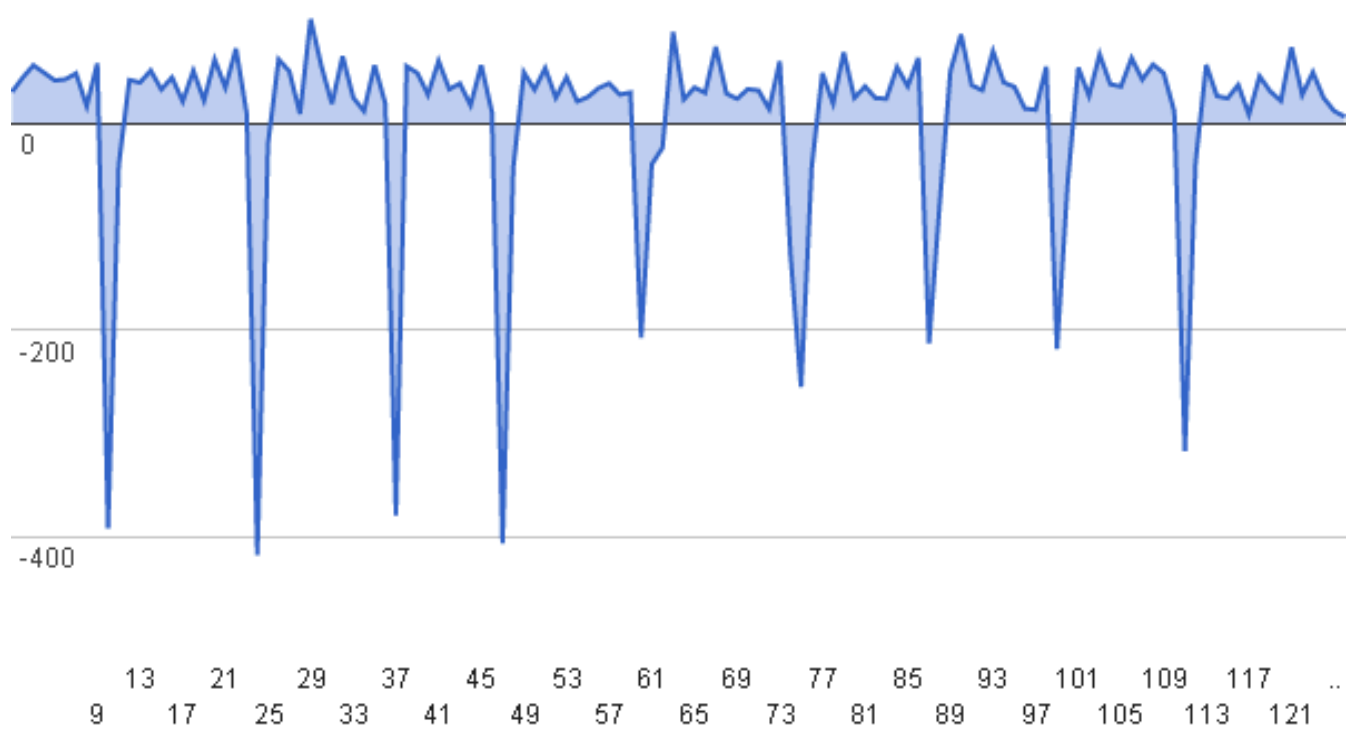
<http://fall-cicada.blogspot.tw/2016/01/detailed-roi-and-accleration-data.html>



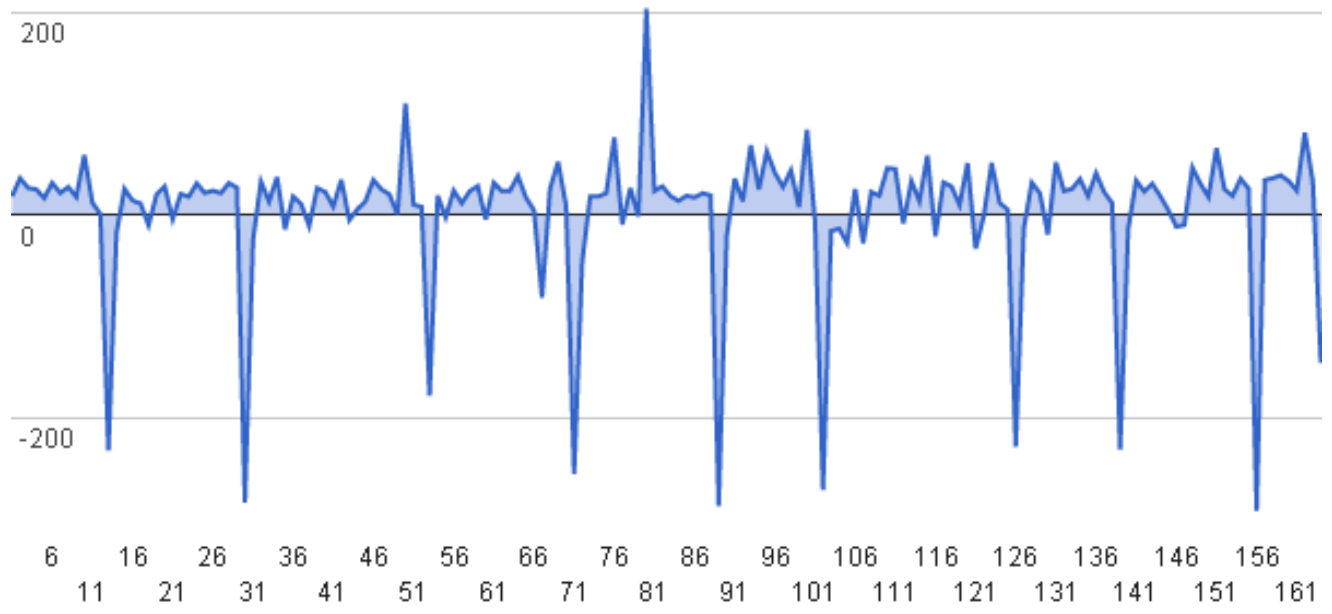
702 Trial2: average velocity within dots line map



701 Trial3: average speed of dot line map



702 Trial3: average speed within dot line map



Reference

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