Harry Potter in Japanese: A Single Participant Study of Extended Bi-modal Language Input

Dominic Cheetham
Sophia University

ABSTRACT

The positive effects of bi-modal input on language learning are becoming a largely accepted experimental finding. However, experiments looking at bi-modal reading in a foreign language are normally limited by the common experimental situation of classroom-based researchers studying university age participants for the limited timespan of a university semester. In this experiment we examined the effects of a seven-month, daily, bi-modal reading programme with a single adult participant. Both quantitative data, of regular measurements of reading speed, and qualitative data, of the subjective experiences of the participant, were collected. Results showed a slow but steady increase in reading speed of approximately 40%, and the participant reported feelings of reading improvement in a variety of measures. The experiment is discussed in relation to the possible benefits of bi-modal reading, especially for adult second-script learners, and a theoretical integration of visual and auditory processing of language input enabling independent mono-modal reading.

INTRODUCTION

This paper reports a single participant study of the learning effects of extended bi-modal input of a foreign language. Specifically, a native English speaker engaged in regular simultaneous reading and listening of a Japanese language narrative text. Previous studies have repeatedly found that bi-modal input has a beneficial effect in a variety of language and other learning measures (Cheetham, 2019). However, as most reading experiments are short term, or classroom-based projects carried out with undergraduate language learners, studies rarely involve controlled daily reading and are commonly limited in duration by the length of the university semester. This study uses a single participant as a preliminary investigation of the effects of regular bi-modal input of a fixed programme of reading over a period of almost seven months, with quantitative measures of reading speed, and qualitative measures based on the subjective responses of the participant. Results show a pronounced increase in mono-modal reading speed and a subjective response that the activity was highly effective in a variety of ways. The results are discussed in relation to recent speculations that the learning benefits of bi-modal input may involve a learned, automatic integration of inputs which ultimately improves mono-modal reading or listening, and possibly also improves the learnability of the target language (Cheetham, 2019).

A further focus of this experiment was to examine whether bi-modal reading input was of any value for older learners with particularly poor reading. It is common for immigrant language learners to have lower literacy levels than oral language levels, especially if they entered a new language environment as adults (Wrigley et al., 2009). However, this is often a reflection of low initial literacy levels in the first language. High literacy levels in a native language commonly transfer to reading skills in a new language (Koda, 2008, p71). However, for some adult learners of languages with new scripts, such as adult English speakers learning Japanese, there are sometimes problems with learning to read in the new language, even if the learner is highly literate in their home language (Abadzi, 2019). Abadzi argues that this lack of transfer has qualities similar to first language developmental dyslexia, and terms it Neoliterate Adult Dyslexia (NAD). NAD is a disadvantage which is found predominantly in older learners learning a new script when already over the age of nineteen, an age which correlates with developmental reductions in cerebral plasticity (Kolb and Gibb, 2011). The participant in this experiment is highly literate in English, but despite high levels of oral Japanese, and despite many hours of study and practice of Japanese reading, has a low level in Japanese reading. Multi-modal input is a standard intervention for first language dyslexia (Snowling, 2013), and the qualitative part of this study attempts to examine whether bi-modal reading had any subjective effect on the dyslexia-like experience of reading in Japanese for this adult learner.

READING WITH LISTENING

Reading with listening has been found to have positive learning effects for first, second and foreign language learners. For first language learners the aim of the studies has mostly been to investigate the possibility of bi-modal input aiding poor readers. Beers (1998) reports visiting a number of classrooms in different schools where audio was used to assist reading. The effects reported are uniformly positive. Students reading with simultaneous audio input show quickly improved reading, greater motivation, improved vocabulary, and greater involvement with schoolwork generally, but with the proviso that the speed of the audio is important, as either too fast or too slow were found to be demotivating for students. A liking or disliking of the voice of the reader also influenced involvement. Le Ferve et al. (2003), studying poor readers in a New Zealand school, report improved comprehension, improvement on normal reading tests, and heightened motivation. Students were happy to be able to read higher level and more interesting texts than they usually read. The positive results persisted for at least ten weeks after the intervention. Menne and Menne (1972) found that bi-modal input improved memorisation of poetry. Other researchers found improvements in listening ability or phonological awareness (Montali and Lewandowski, 1996; Littlejohn et al., 2006).

For second language learners Blum et al. (1995) report very positive reactions from readers, improved reading skills, and an ability to read at higher levels with audio than without. Bi-modal input has been found to have positive effects on vocabulary acquisition (Chang, 2011), listening ability (Chang, 2009; Chang and Millett, 2015), reading speed and fluency (Blum et al., 1995; Chang and Millett, 2015), reading comprehension (Blum et al., 1995; Chang and Millett, 2015) and participant/student motivation (Blum et al., 1995; Brown et al., 2008; Chang, 2009). Occasional inconclusive results (eg Taylor, 2005) can largely be explained as a result of a poor match between the materials used and learner abilities (see Winke et al., 2010).

Recent speculations

Existing experimentation on bi-modal input and language learning rests on an implied assumption that the positive effects directly result from the combined data of the two input modes. Visual data (the written text) and aural data (the spoken word) are carrying much the same language information, with large areas of overlap and smaller areas of data that is specific to one or other input modality. Thus, the overlap produces an enormous increase in redundancy, which increases the chance of accurate uptake of input The mode specific data (such as punctuation, spaces between words, spelling, and text formatting for visual input, and stress, speed, intonation and emotive effects for aural input) expands the sum of meaningful data available for linguistic processing. This perception of bi-modal input has been described as an 'additive' model (Cheetham, 2019). The additive model assumes that the learning benefits of bi-modal input are a simple result of the increase in data and redundancy achieved through bi-modal input and are limited to the time of input/processing. The additive model predicts that future gains in mono-modal processing would result from global improvements in language ability or specific gains in listening or reading as a direct result of time spent in successful reading or listening. However, studies examining the neurological effects of bi-modal input show that something more complex may be taking place (Cheetham, 2019). Analysis of brain activations shows that at the neurological level, bi-modal input may produce a superadditive effect where the data stream ascending to the higher language processing areas of the brain is actually greater than the sum of the two mono-modal streams (Van Atteveldt, 2007). This superadditive effect is dependent upon experience and is therefore a learned or developmental effect (Man et al., 2012). Competent readers in their native language are likely to have already developed a strong superadditive effect simply through the normal processes of learning to read. However, second or foreign language learners will quite often have learnt in a largely mono-modal learning environment, as traditionally, language teaching, either through instructor antipathy or through technological limitations, tends towards mono-modal input (Danan, 2004), and consequently may well not result in a well-developed superadditive effect.

In this experiment the aim was not to attempt any empirical measure of a superadditive effect, but rather to measure learning effects of a bi-modal input programme and to examine the subjective reports of the participant in relation to the predictions of a superadditive effect.

METHODOLOGY

Research Questions

Over an extended period of bi-modal reading:
1) Are there changes in the participant's reading ability, as measured by reading speed?
2) What are the participant's subjective judgements about speed of reading, levels of comprehension, vocabulary, kanji (Chinese characters), overall language ability, foreign language confidence and motivation?
3) Do the quantitative results on reading speed and the subjective responses by the subject support or confirm each other?

Participant

 The participant was an adult native English speaker with approximately 30 years living in Japan. Japanese ability is upper-intermediate in speaking and listening skills, but considerably lower in reading and writing skills. The participant had spent very many hours studying kanji up to the 2,000-character level, and (mono-modally) reading authentic Japanese texts for children as extended practice. Despite having studied kanji extensively, the participant had great difficulty maintaining kanji levels and found forgetting to be very rapid. Reading levels were restricted by the weakness in kanji reading, but when reading texts for children (where kanji are often glossed phonetically) was a capable reader in terms of comprehension, though lacking in speed. The participant, in short, is the kind of language learner who has a high functional ability in the target language but has reached a level where traditional learning processes and interventions produce little noticeable improvement. The poor reading ability is a feature not unusual in adults learning to read in a language with an unfamiliar scripting system, sometimes called Neoliterate Adult Dyslexia, or NAD, (Abadzi, 2019). Learner profiles of this nature are common in expatriate and immigrant communities, and in foreign language learners who have an extended and varied learning history but who have reached a practical plateau where further improvement requires investment which may not balance the learning gains.

Method

 Because of the participant's interest in children's literature we chose a reading text for children. Audio books in Japan are still a novelty and there were no native Japanese texts available at an appropriate level and with a commercially produced audio book. As a result, we chose the *Harry Potter* series, translated into Japanese, as the reading material for this experiment. Over the course of the experiment the participant completed the first two books of the series. The texts were also considered a good choice for extensive reading as they were comparatively easy to read having a level of unfamiliar vocabulary of just under two percent for this participant (Nation, 2015).

 As a reading process, we needed mono-modal reading for the measurement of reading speed, and bi-modal reading for the main reading practice. Reading speed was measured twice in order to reduce the influence of environmental factors. Bi-modal reading was carried out twice on the same text, as repetition is a powerful facilitating factor in most kinds of learning, and we wanted to allow the greatest possible opportunity for learning. Repetition of reading experience is also a standard feature of multi-modal interventions for developmental dyslexia (Wexler, et al., 2008).

 It might have been possible to use two separate texts for bi- and mono-modal reading. However, we eventually decided to use the same text for both the bi-modal experience and the mono-modal testing. In this way, results would be directly comparable, and differences in reading speed resulting from different content, different vocabulary or kanji, or different levels of difficulty would be avoided. Since the participant would be reading both mono-modally (for the timed readings) and bi-modally, it is possible that any learning effects could be a result of the testing. Whilst it is true that the testing almost certainly had some effect, it is also true that despite many hours of mono-modal Japanese reading experience over a period of many years the participant was still a very poor reader. We considered it likely that any notable reading improvements would be more likely to be a result of the bimodal reading, especially in the light of the positive findings generally associated with bi-modal reading as compared to mono-modal. In the latter two parts of the experiment the timed mono-modal reading was reduced from daily

to once in five days, thus increasing the likelihood of any positive effects being a result of bi-modal reading.

Reading and data collection was always carried out in the morning between the hours of 8 and 10, in a quiet environment using noise-cancelling earpods. The reading materials were printed paperback books, and the audio was from the published Japanese audiobook CDs. The reading programme was revised twice at the 60-day and 120-day points. These revisions were made in an ongoing response to the participant's perceptions of the reading process.

First reading sequence (part 1)

A daily reading programme for a total of 60 days.

i)   Approximately two pages of text, read with bi-modal audio and visual input.
ii)   The same two pages read again without audio, timed.
iii)   The same two pages read again with bi-modal audio and visual input.
iv)   The same two pages read again without audio, timed.

The length of reading was dictated by the tracks on the audiobook, which are approximately 3 minutes in length, but vary according to the contents of the story. The total reading for each day was 8 pages.

Second reading sequence (part 2)

A daily reading programme for a total of 60 days.

The participant was starting to find the daily timed readings a little onerous, and the speed of progression through the book (two new pages per day) a little frustrating in terms of story appreciation. Also, the initial results showed a plateauing of improvement in reading speed. Following the assumption that bi-modal reading time was more valuable for learning than timed reading, it was decided to change the reading sequence to have a greater proportion of bi-modal reading time. Testing was reduced to once every five days. Thus, there was a five day reading cycle with four days of purely bi-modal reading followed by one day with both bi-modal reading and mono-modal reading for testing. Non-test days had no mono-modal reading but had a longer bi-modal reading period. The bi-modal reading was still repeated in an attempt to maintain consistency and to retain any learning benefits of repetition.

i)   For non-test days: approximately six pages of text, read daily, with bi-modal audio and visual input, followed by the same six pages, read again, with bi-modal audio and visual input.
ii)   Every fifth day the same reading sequence as used in part 1 was repeated for data collection.

The total reading for each day was 12 pages, with 8 pages on data collection days.

Third reading sequence (part 3)

Reading on 60 days over a total of 90 days.

Sometimes other commitments made daily reading impractical for the participant, so for the third phase of the experiment we decided to allow more flexibility. The reading was mostly carried out on a daily basis, but occasionally there were days with no reading. The amount of reading per day was also made more flexible as the participant expressed frustration at having to stop in the middle of 'interesting bits'. However, the average daily reading (not including data collection days) remained almost the same at approximately seven pages per day of reading, read twice.

i)   Approximately seven pages of text, read almost daily, with bi-modal audio and visual input.
ii)   The same seven pages, read again with bi-modal audio and visual input.
iii)   After every five days of bi-modal reading the same reading sequence as used in part 1 was repeated for data collection.

The total reading for each day averaged at 14 pages, with 8 pages on data collection days.

Data

Reading speed is conventionally calculated in terms of words/minute. However, the Japanese language does not have spaces printed between words and it is a largely subjective decision as to whether some pieces should be counted separately or as compound words. The initial data collection for this study was therefore based on comparing reading times for the audio narrator and for the study participant. The assumption behind this is that the narrator for the novels, as a professional reader, would be fairly consistent in his reading speed, and that the approximately three minutes of daily reading would allow enough time to allow minor changes in speed to average out.

The timed readings in the data collection were converted to ratios of the time taken by the audio narrator to read the same piece of text. Thus, for example, the CD audio time for the first day of the experiment was 180 seconds, the first timed reading was 625 seconds, and the second timed reading was 495 seconds. The first timed reading by the participant was therefore 3.47 times longer than the CD. The second reading was 2.75 times longer than the CD. Each data collection throughout the study, therefore, produced two ratios which could be considered separately or averaged into an overall result.

However, as the study proceeded, there was a growing feeling that this method of calculating speed was insufficiently accurate. There were many times when the participant's self-evaluation of their reading fluency had a mismatch with the data produced. Indeed, the apparent plateauing of improvement in the data, in contrast to the participant's feelings of increased fluency and ease, was one of the factors which motivated the modifications in the make-up of the three experimental sequences.

In order to check the reading speed of the narrator we carried out a syllable count of the text. Japanese is a syllable-timed language, and as such, for a consistent reading speed we would expect a correspondingly similar number of syllables read over a given time. Speeds were calculated in syllables/second.

The syllable count revealed major differences in reading speed for the narrator, especially for the ends of chapters and for the latter parts of the books. It appears possible that the narrator was working to fit chapter endings into convenient blocks of reading, and was also attempting to

match the total reading time to the practical limits of audio CDs. As a result, the participant's reading speeds were recalculated in syllables-per-second. The recalculations were made for every fifth day of reading for part 1, and for all data collection points for parts 2 and 3.

RESULTS

Quantitative results: Part 1

Table 1: *Reading speeds (syllables / second). Part 1*

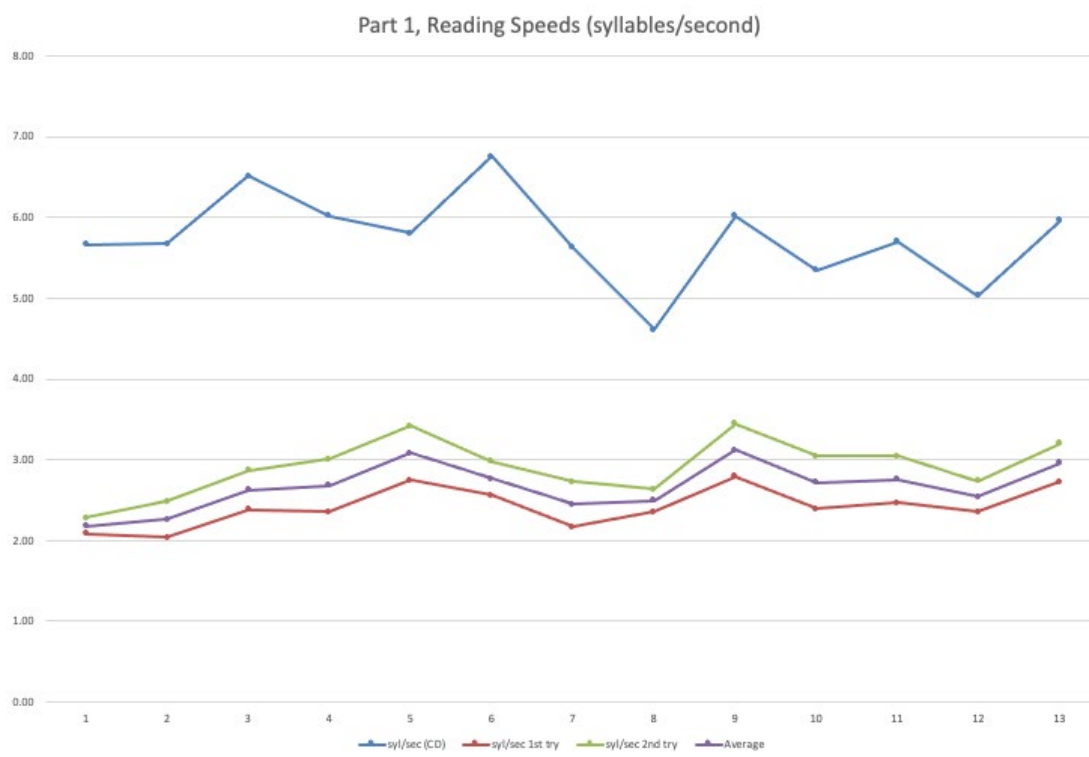| Data Collection	1	2	3	4	5	6	7	8	9	10	11	12	13
Syllable count	866	1038	1277	843	888	1094	1143	1140	873	1042	1037	1223	984
syl/sec (CD)	5.66	5.67	6.52	6.02	5.80	6.75	5.63	4.62	6.02	5.34	5.70	5.03	5.96
syl/sec 1st try	2.09	2.04	2.39	2.35	2.75	2.56	2.17	2.36	2.80	2.40	2.47	2.35	2.73
syl/sec 2nd try	2.28	2.48	2.87	3.01	3.42	2.98	2.73	2.64	3.45	3.05	3.04	2.74	3.21
Average	2.18	2.26	2.63	2.68	3.08	2.77	2.45	2.50	3.12	2.72	2.76	2.55	2.97

Fig. 1. Comparative reading speeds for part 1. Data collected on each fifth day.

Quantitative results: Part 2

Table 2: *Reading speeds (syllables / second). Part 2*

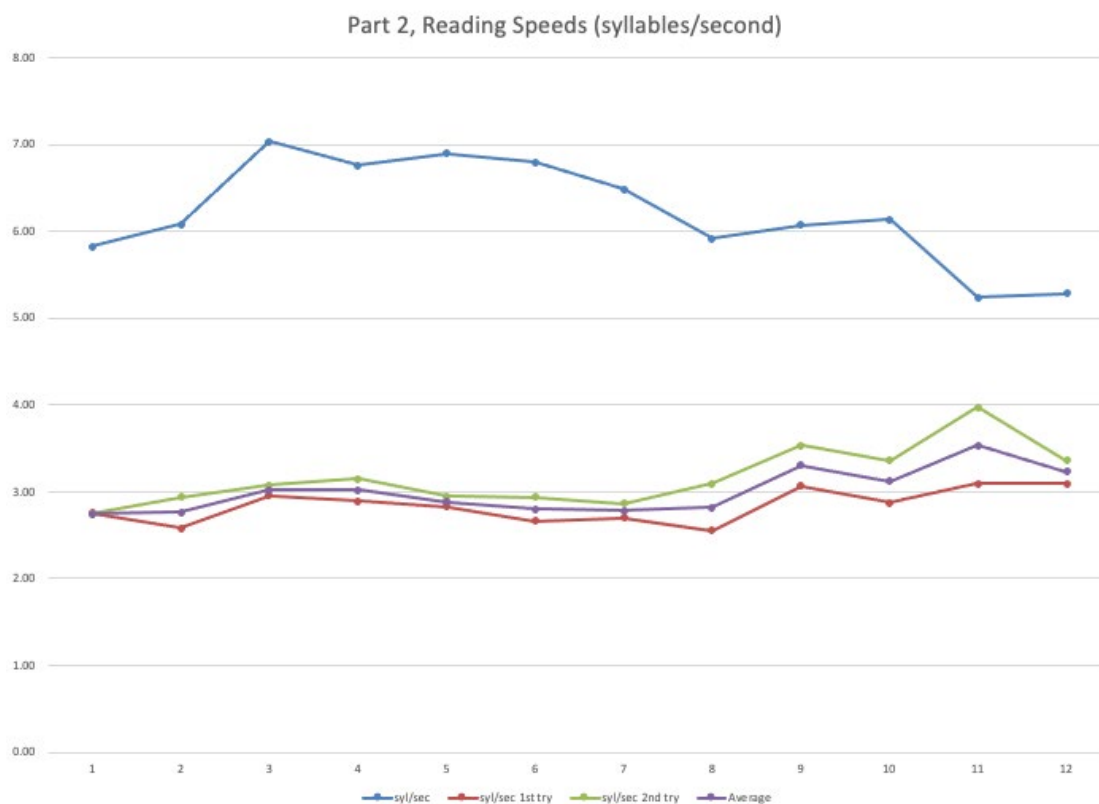| Data Collection	1	2	3	4	5	6	7	8	9	10	11	12
Syllable count	1136	894	837	1014	1028	1053	1024	1094	972	1012	954	1093
syl/sec (CD)	5.83	6.08	7.03	6.76	6.90	6.79	6.48	5.91	6.08	6.13	5.24	5.28
syl/sec 1st try	2.75	2.58	2.96	2.89	2.82	2.66	2.70	2.56	3.07	2.88	3.10	3.10
syl/sec 2nd try	2.74	2.94	3.08	3.15	2.95	2.94	2.87	3.09	3.53	3.36	3.98	3.36
Average	2.75	2.76	3.02	3.02	2.88	2.80	2.79	2.82	3.30	3.12	3.54	3.23

Fig. 2. Comparative reading speeds for part 2. Data collected on each fifth day.

Quantitative results: Part 3

Table 3: *Reading speeds (syllables / second). Part 3*

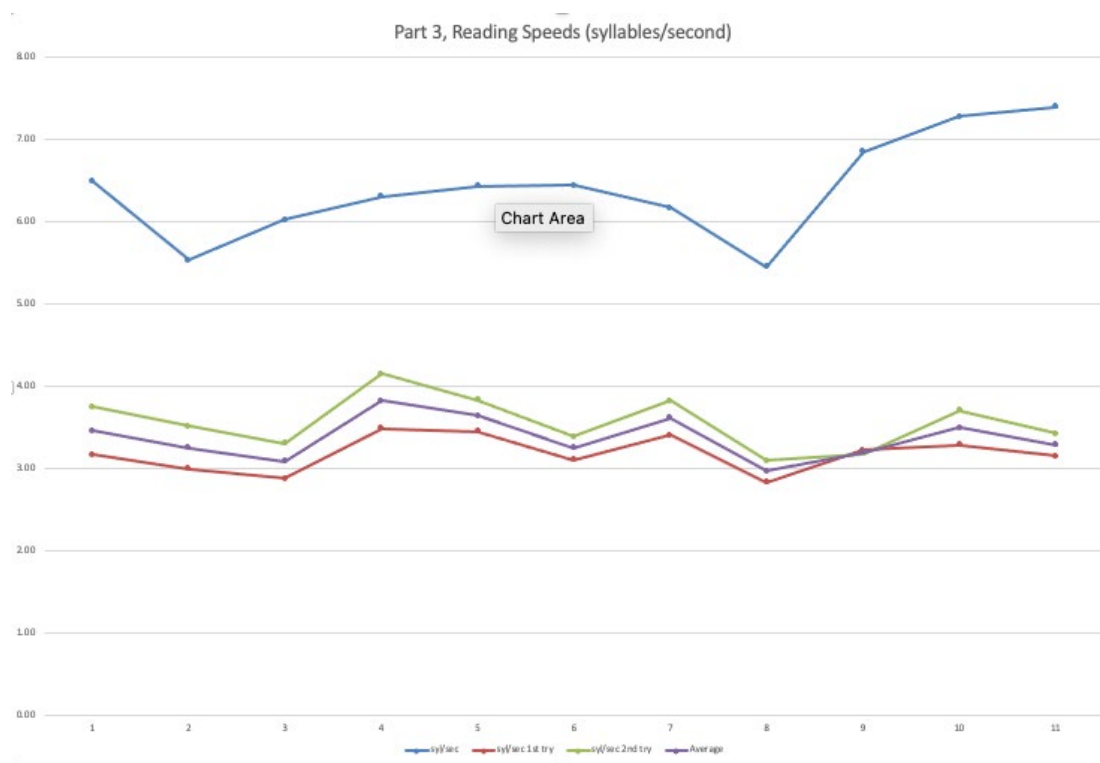| Data Collection	1	2	3	4	5	6	7	8	9	10	11
Syllable count	968	1250	1090	1192	984	1050	937	1041	987	1157	1183
syl/sec (CD)	6.50	5.53	6.02	6.31	6.43	6.44	6.16	5.45	6.85	7.28	7.39
syl/sec 1st try	3.16	2.99	2.88	3.49	3.45	3.11	3.41	2.83	3.23	3.29	3.15
syl/sec 2nd try	3.75	3.51	3.30	4.15	3.83	3.39	3.82	3.10	3.17	3.71	3.42
Average	3.46	3.25	3.09	3.82	3.64	3.25	3.62	2.96	3.20	3.50	3.28

Fig. 3. Comparative reading speeds for part 3. Data collected on each fifth day or reading.

Parts 1 and 2 appear to show some small improvement in reading speed. Part 3, when considered alone, appears to show a decrease in reading speed. However, for each data point there are a number of variables which contribute to inconsistency in the findings. Testing was controlled for location, time and auditory volume; however, it was impossible to control for variations in tiredness, health, or the relative difficulty of each piece of text. Reading speed is reactive to textual difficulty. In the case of Japanese this is not only content, the vocabulary and the grammar, but is also a feature of how many and which kanji occur in the text. Consequently, results are best examined with as many data points included as possible, as this will tend to even out the point-by-point variations.

Graphical expression of the data points for the three parts of the experiment combined show an overall slow, but steady improvement in reading speed.
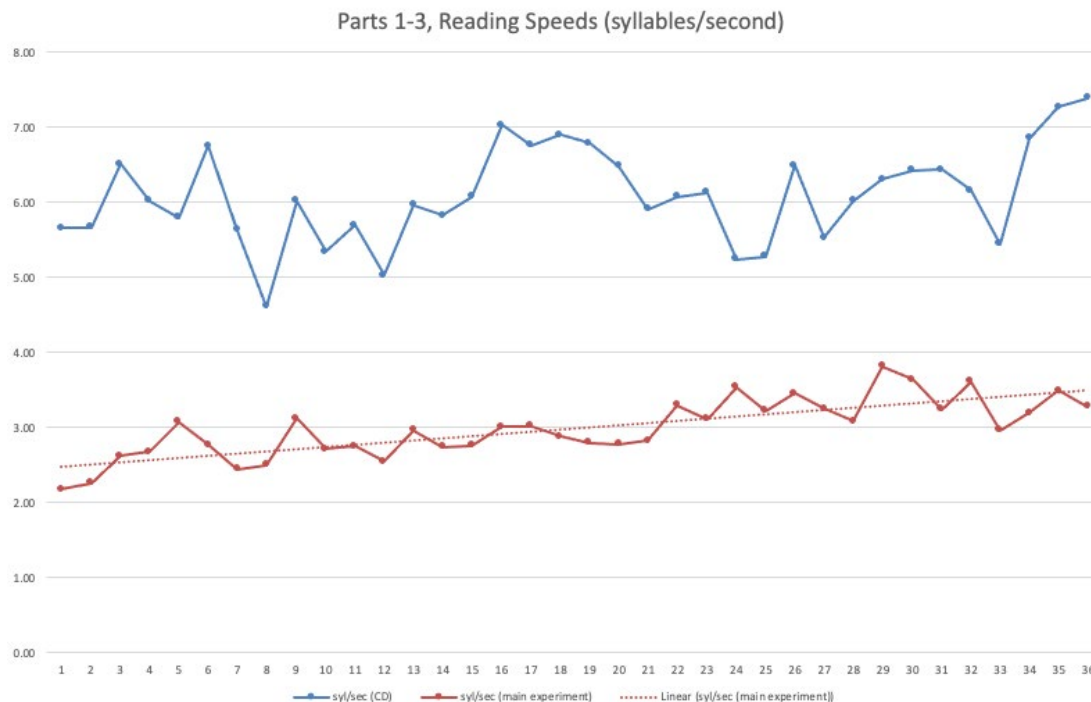
Fig. 4. Comparative reading speeds for part 1-3.

Graph 3 shows overall improvement in reading speed from approximately 2.5 syllables/second to approximately 3.5 syllables/second, an increase of approximately 40%.

Repeat testing

In order to confirm that there really was an improvement in reading speed, and that it was not simply an artifact produced by uncontrolled variables, we returned to all 36 data points and repeated the data collection procedures. The hypothesis was that if the improvement was real, the repeated test would show higher reading speeds than the initial test, and greater improvement over the earlier data points than over the latter data points. The time between the first data collection and the repeat of this data point was just over seven months. The repeat data was collected over a period of one month. Textual familiarity may have boosted the results of the repeat test for the latter points with just one month of separation, but was considered less likely to have a large effect for the earlier data points with a separation of seven months.

The repeat tests show a fairly consistent reading speed with an overall average of 3.75 syllables/second. The peaks and troughs of the first run of data collection compared with the repeat run showed a high degree of consistency, indicating that considerable amount of the variation in speed for different data points was based in textual variation rather than variation in the environment or the emotional/physical state of the participant.
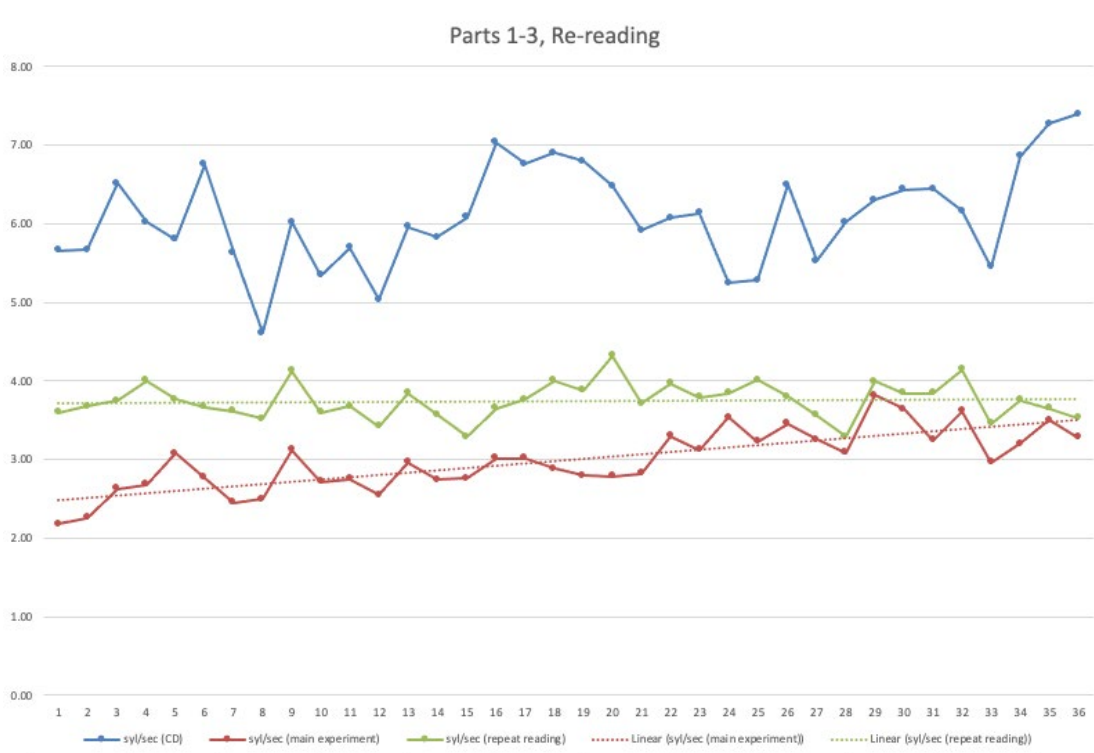
Fig. 5. Comparative reading speeds for parts 1-3 and post-experimental repeat testing.

Discussion of quantitative results

This experiment has only a single participant and the only control is the pre-control of the participant's previous failure to become a competent reader of Japanese. As a result, the experiment lacks any statistical analysis which might support the raw results. However, the unusual length of the experiment serves to balance local variation in results and adds enough validity to present the results as an indication that there may be value in bi-modal and repeated reading as an intervention for increasing reading speed. The length of the experiment in relation to the variation in results for individual data collection points, shows that reading speed experiments generally need to be treated with caution, especially with non-standardised reading materials such as novels. Using non-standardised reading materials may invite criticism of the experiment. However, from a motivational point of view the materials used were essential to the experiment. The participant managed to maintain interest and to continue the experiment as a direct result of being able to read texts which they felt had cultural and linguistic authenticity.

Returning to the start of book 1 and repeating the data collections showed that there was a strong and robust increase in reading speed. Whilst the reading speeds for the participant show little correspondence with the reading speeds for the narrator, there is a great deal of correspondence between the initial reading and the repeat reading for the participant. This indicates that whatever factors encouraged speedier or slower reading the first time, had a similar effect the second time around. This is most likely a result of an interaction between content and/or linguistic difficulty, and reading speed.

The overall increase in reading speed, especially considering that this participant already had a great deal of experience in mono-modal reading, indicates that the bi-modal reading may

have been having a positive effect on overall reading sped and ability. However, this data alone can only show an improvement based on the actual reading behaviours, namely, both bi-modal and timed mono-modal reading, with built in repetition of the reading. At this point, the subjective experiences of the participant become important.

QUALITATIVE DATA

Through the course of this experiment the participant kept notes of their thoughts and reactions in relation to the reading sessions. What follows is a summarized overview from the point of view of the participant.

Expectations.

I expected that the high level of repetition might become boring. The initial plan involved eight repetitions of the same two pages for each day of reading. Surprisingly the repetition was not a problem. Each repetition made me feel I was understanding better and reading better. However, I did grow tired of the timed readings. Timed reading moves the focus from enjoyment to performance, and I found this was considerably less satisfying than just reading the book. The latter stages of the study had less timed reading and this made it much easier and much more enjoyable to continue the project.

Difficulty

I had tried reading *Harry Potter* in Japanese before but had quickly put it aside as being too difficult for me. As predicted with any model of bi-modal input, the bi-modal experience resulted in much easier and much more enjoyable reading, and I had little trouble reading the text. This alone made the experiment worthwhile for me.

At first, I found reading with listening a little awkward. The narrator was sometimes too fast, and it was difficult to pause or to re-read sections. I put this down to my lack of experience and lack of ability in integrating the two media. I hoped I would get quickly used to this format. This proved to be the case, and after about a week I felt much more comfortable with the reading process. Reading had become more like reading in my home language of English. It was still much slower than English, but I now felt I could, to a certain extent, lose myself in the book, rather than always being completely, and painfully, aware that I was reading, which is my usual experience in reading Japanese.

By the end of the project, I felt that reading was easy and smooth – something I had never before felt in reading Japanese. My vocabulary level was probably improved, and I got used to the longer more complex sentence structures of the book, but the main thing was that I had better and better recognition of the kanji (Chinese characters). In my everyday life I felt I was communicating much better in Japanese and had more variety of expression than I had had before.

Listening

One drawback of this project was that I did not really like the narrator's voice. I found him irritating. This was a powerful demotivation, but the pleasure in being able to read more quickly and to read at a higher level than before balanced this out. Despite not really liking the

sound of the narration, after a week or so I no longer really noticed the narrator, and the level of irritation reduced.

Reading

My Japanese reading is generally much slower and much less effective than my listening. At the beginning of the project, it was difficult to combine the two inputs. I felt I was doing two jobs at the same time – reading the text and listening to the text. However, this feeling of disjointedness gradually reduced, and by the end of part 1 I felt as though that the two inputs were working in concert. Reading became much smoother and much more comfortable. This feeling was in opposition to the initial data on reading speed, and was strong enough to motivate changes in the experimental process. I felt that the bi-modal input was easier to understand, and enjoyed the story more with bi-modal input, I also felt faster, but the results did not reflect this. Because of my positive feelings about the bi-modal reading we changed the structure of the reading to allow more bi-modal reading. This was very satisfying from a reader point-of-view, but still seemed to result in little actual improvement in the reading speed data. This was disappointing, but the subjective feelings of improvement allowed me to continue the experiment. Satisfyingly, the post-experimental recalculation of data according to syllabled/second produced a result more in keeping with my subjective feelings, and, at the same time, revealed an error in the original assumptions about the narrator's reading speed.

Neoliterate Adult Dyslexia

I had never heard of NAD before the planning of this experiment. However, hearing of this theory produced an intense feeling of relief. I am not dyslexic in English, and I had no reason to believe I would show any features of dyslexia in Japanese. However, there was at least a surface similarity, especially in the disparity between my listening and speaking ability and my reading and writing ability, despite large amounts of practice. With NAD as a conceptual framework, some of my reading experiences now started to make sense.

It is difficult to describe how it feels to be a bad reader. It is slow, frustrating, there is difficulty in identifying sounds, meanings sometimes need conscious consideration instead of slipping into the brain whole and well-formed. It feels as though there is a kind of semi-permeable membrane reducing and distorting the flow of the language from the page and into my head. It is a very uncomfortable experience for someone who is, in their first language, a very capable, in fact, almost compulsive, reader. I cannot say whether actual features of dyslexia exist in my Japanese reading, and I cannot say whether they reduced during this experiment. However, I can say that reading became much smoother, much easier, the metaphorical membrane was still there, but it became thinner. In short, reading in Japanese slowly came to feel more like real reading, as opposed to some sort of problem-solution or decoding exercise. Over the course of the experiment, I felt that the concept of NAD became less strongly applicable to my own reading experience, and even if there had been no improvement in reading speed, this alone would have justified the effort of doing the experiment.

After the experiment

The whole project was rather intensive, focusing on daily reading and testing. I kept to this to try to maintain the validity of the experiment, but once the experiment finished, I moved to a more relaxed process. I read bi-modally less often, and I read for longer periods (usually 20 minutes to an hour), but not daily. Nor do I repeat reading the same pages as much as I did in the

experiment, though I do still repeat about one page in five. I like reading bi-modally, but often find it inconvenient, either because of the physical practicalities of setting things up, or because it is basically more antisocial than simple mono-modal reading. Also, in Japanese, the availability and often the quality of audiobooks is very limited. However, having worked through the project I found my reading ability generally to be much better than before, and found that the impression of hearing the text in my mind as I read (mono-modally) is much better. In fact, before this project I did not have any impression of hearing as I read. I assume that my brain has, to some extent, learned to integrate the sound and the written text better than before taking part in the experiment. The general improvement in Japanese and the specific improvement in reading seem to be quite solid, and over a year later I am not experiencing any noticeable relapse, and am indeed now comfortably reading adult novels.

OVERALL DISCUSSION

Bi- or multi-modal input is known to be a powerful contributor to many different kinds of learning (Cheetham, 2019) and as a natural and normal part of human experience and learning (Turk, 2009). As such, this experiment was not attempting to show whether bi-modal reading was an effective learning tool. Instead, it was trying to discover some of the effects of extended bi-modal reading on reading speed and on the subjective reactions of the participant. Both proved to be very positive.

Whether or not the bi-modal reading was the main cause of the improvement in reading speed, it certainly played an important part. Bi-modal input generally allows reading at a higher level than does mono-modal input. It also allows a greater involvement in the story and takes conscious attention away from the physical text. Without bi-modal reading the participant was not able to read these texts with any kind of fluency, but with bi-modal reading they could read, understand, and enjoy the reading experience. Reading enjoyment and satisfaction, are powerful contributors to overall motivation. However, the reading improvements found in this experiment are very high. A 40% increase in reading speed, for a learner who had failed to improve significantly over a very long period of time and with many hours of study, is a very strong effect. The participant's impressions of being able to better 'hear' mono-modal text as they read may be an indication of greater integration between different areas of the brain, and may be an indication of a superadditive effect, but this cannot be reliably confirmed without fMRI testing, something which is not available to this researcher.

The quantitative data alone, since it lacks any statistical verification, may not be enough to argue a positive effect of extended bi-modal reading. Likewise, the qualitative data from the participant might also be unconvincing on its own. However, the combination of data types leads us to claim positive effects for reading speed, for reader satisfaction and subjective measures of improvement, and also for the additional benefits of confidence, and subjective feelings of general Japanese language improvement. Adult learners of languages with scripts different to their home languages are very common, and difficulties in becoming a capable reader in a different script as well as a different language are not unusual. Whether this has any more than surface similarities to developmental dyslexia remains to be seen, but the similarities provide a useful framework for both understanding and for the development of reding programmes. Many adult learners have trouble reading in a foreign language, especially if they were not highly literate in their home

language or if the new language is in a different writing system. Extended bi-modal reading is certainly an intervention which invites further study and investigation.

Instructional Implications

The experimental procedure followed in this experiment is not practical in most instructional settings. However, as either a self-study or classroom-based technique, any form of repeated bi- or multi-modal language input is likely to lead to language development. This being said, quantitative research on optimum time spent with bi-modal experience, or optimal frequencies of experience is still lacking. However, long-standing and robust finding in the general psychology of learning suggest that distributed learning over an extended period is the most effective strategy for a variety of learning aims and behaviours (Son and Simon 2012). This study made use of a children's novel as the input material. There is no specific need to use similar materials. Indeed, for motivational reasons, as with this study, the selection of materials which are both attractive and meaningful for the learner(s) should be a primary consideration. Materials could be print plus audio, but could also be video with same-language audio and subtitles. DVD, and also streaming platforms for video sometimes offer same language subtitles, depending upon the language, and these can be an attractive and easily available options.

In a classroom setting, bi-modal experience could be introduced as a regular part of a class, or could be assigned as self-study. In the classroom situation it is essential that learners be able to both hear and read the text. The conventional situation often found in child teaching, of a teacher holding a single copy of a text, such as a picturebook, and reading aloud whilst showing the pictures to the class, may have a surface appearance of bi-modality, but since most of the learners cannot see the printed text clearly, this is actually a very different kind of learning situation.

In the self-study option it is very difficult to be sure that learners are actually giving themselves bi-modal input. In the experience of the author, learners are happy to experience texts bi-modally in the classroom, but for self-study they are likely to revert to mono-modal experience. Mono-modal experience is simpler, because learners can just pick up a book and read. Therefore, if bi-modal experience is to be used for self-study parts of a course there needs to be some extra stimulus to encourage actual bi-modal experience, or some sort of structural support for the learners. Anna Husson Isozaki has addressed both these problems. She argues that instruction resulting in understanding of the research behind bi-modal experience, and the potential learning benefits of such experience, is in many cases sufficient to motivate learners to make the extra effort of giving themselves repeated bi-modal input (Isozaki 2018). Isozaki also provides evidence of how online resources which allow access to both print and the associated audio can also encourage learners to use bi-modal materials, and not insignificantly, to also give teachers numerical feedback on the amounts of reading and listening performed out of class (2022). In both these situations Isozaki reports significant gains in learning with bi-modal materials.

Whatever choices are made in terms of instructional forms or content, the rapid advances and expansion in audio-visual accessibility, both in and outside formal educational settings, makes bi-modal experience a highly accessible choice, as well as a potentially very beneficial learning intervention.

REFERENCES

Abadzi, H. (2019). Neoliterate adult dyslexia and literacy policies: a neurocognitive research review of a curious unexplored phenomenon. *IBE Unesco*. https://unesdoc.unesco.org/ark:/48223/pf0000368404

Beers, K. (1998). Listen while you read: struggling readers and audiobooks. *School Library Journal 44*(4), 30–35.

Blum, I. H., Koskinen, P. S., Tennant, N., Parker, E. M., Straub, M., & Curry, C. (1995). Using audiotaped books to extend classroom literacy instruction into the homes of second-language learners. *Journal of Reading Behavior*, *27*(4), 535-563.

Brown, R., Waring, R., & Donkaewbua, S. (2008). Incidental vocabulary acquisition from reading, reading-while-listening, and listening to stories. *Reading in a Foreign Language, 20*(2), 136–163.

Chang, A. C. S. (2009). Gains to L2 listeners from reading while listening vs. listening only in comprehending short stories. *System*, *37*(4), 652-663.

Chang, A. C. S. (2011). The Effect of Reading While Listening to Audiobooks: Listening Fluency and Vocabulary Gain. *Asian Journal of English Language Teaching*, *21*, 43-64.

Chang, A. C. S., & Millett, S. (2015). Improving reading rates and comprehension through audio-assisted extensive reading for beginner learners. *System*, *52*, 91-102.

Cheetham, D. (2019). Multi-modal language input: A learned superadditive effect. *Applied Linguistics Review*, *10*(2), 179-200.

Danan, M. (2004). Captioning and subtitling: Undervalued language learning strategies. *Meta: Journal des traducteurs Meta: Translators' Journal 49*(1), 67–77.

Isozaki, A. H. (2018). Reading-listening and reading circles: Bimodal approaches building fluency. *The Reading Matrix: An International Online Journal, 18*(1), 82-103.

Isozaki, A. H. (2022). What if they are set free? Using Autonomous Reading-Listening and Book Clubs in Reading Fluency Development. *TESOL-EJ, 26*(3), 1-26.

Koda, K. (2008). Impacts of prior literacy experience on second language learning to read. In Koda, K., & Zehler, A. M. (Eds.), *Learning to read across languages: Cross-linguistic relationships in first-and second-language literacy development* (pp. 68-96). Routledge.

Kolb, B., & Gibb, R. (2011). Brain plasticity and behaviour in the developing brain. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, *20*(4), 265-276.

Le Fevre, D. M., Moore, D. W., & Wilkinson, I. A. (2003). Tape-assisted reciprocal teaching: Cognitive bootstrapping for poor decoders. *British Journal of Educational Psychology*, *73*(1), 37-58.

Littleton, K., Wood, C., & Chera, P. (2006). Interactions with talking books: Phonological awareness affects boys' use of talking books. *Journal of Computer Assisted Learning*, *22*(5), 382-390.

Man, K., Kaplan, J. T., Damasio, A., & Meyer, K. (2012). Sight and sound converge to form modality-invariant representations in temporoparietal cortex. *Journal of Neuroscience*, *32*(47), 16629-16636.

Menne, J. M., & Menne, J. W. (1972). The relative efficiency of bimodal presentation as an aid to learning. *AV communication review*, *20*(2), 170-180.

Montali, J., & Lewandowski, L. (1996). Bimodal reading: Benefits of a talking computer for average and less skilled readers. *Journal of learning disabilities*, *29*(3), 271-279.

Nation, P. (2015). Principles guiding vocabulary learning through extensive reading. *Reading in a Foreign Language*, *27*(1), 136–145.

Son, L. K., & Dominic A. Simon, D.A. (2012). Distributed learning: Data, metacognition, and educational implications. *Educational Psychology Review*, *24* (3), 379-399.

Snowling, M. J. (2013). Early identification and interventions for dyslexia: a contemporary view. *Journal of Research in Special Educational Needs*, *13*(1), 7-14.

Taylor, G. (2005). Perceived processing strategies of students watching captioned video. *Foreign Language Annals*, *38*(3), 422-427.

Turk, M. (2014). Multimodal interaction: A review. *Pattern recognition letters*, 36, 189-195.

Van Atteveldt, N., Roebroeck, A., & Goebel, R. (2009). Interaction of speech and script in human auditory cortex: insights from neuro-imaging and effective connectivity. *Hearing Research*, *258*(1-2), 152-164.

Wexler, J., Vaughn, S., Edmonds, M., & Reutebuch, C. K. (2008). A synthesis of fluency interventions for secondary struggling readers. *Reading and Writing*, *21*(4), 317-347.

Winke, P., Gass, S., & Syodorenko, T. (2010). The effects of captioning videos used for foreign language listening activities. *Language Learning & Technology*, *14*(1), 65-86.

Wrigley, H. S., Chen, J., White, S., & Soroui, J. (2009). Assessing the literacy skills of adult immigrants and adult English language learners. *New Directions for Adult and Continuing Education*, 121, 5-24.

Dominic Cheetham *teaches children's literature at Sophia University, Tokyo. He is researching the various roles of children's literature in language learning, particularly in relation to second or foreign language learning and the learning of minority languages.*

Email: c-domini@sophia.ac.jp