

# DEAF ADULTS AND COMPREHENSION OF EXPOSITORY TEXTS

MONICA REICHENBERG

*The University of Gothenburg, Sweden*

**Abstract:** The study presents a comparison between deaf participants' (14-65 years of age) comprehension of expository texts. Each participant was exposed to 12 texts with regard to the following four different conditions: 1. Silent reading of an authentic text. 2. Viewing of a videotaped signed authentic text. 3. Silent reading of an easy-to-read text. 4. Viewing of a videotaped signed easy-to-read text. The conditions were counterbalanced in order to control order and passage effects. The good deaf readers had a higher mean score than the poor deaf readers on all text versions. There was a significant difference in mean scores between good deaf and poor deaf readers on the easy-to-read text version. How then can the results be explained? All of the easy-to-read texts were much shorter than the authentic texts. However, since there has to be the identical content as in the authentic texts, there was much implicit information in the easy-to-read texts. Consequently, the reader needs prior knowledge and reading experience to fill in the missing information in the text. A conclusion is that the easy-to-read texts did not serve their purpose then since the process of simplification itself has given rise to the removal of structures that are relevant to facilitate understanding.

**Key words:** deaf readers, reading comprehension, expository texts, authentic texts, easy-to-read texts

**Chinese**

[Translation Shek Kam Tse]

《失聪人士对阐述式文字的理解》

摘要:

是次研究比较一群失聪人士（14至65岁）对阐述式文字的理解。每位参与者都会接触12篇文章，12篇文章共分为四种类：一、静读原文；二、观看附有原文的录像带；三、静读原文的简化版；四、观看附有简化版文字的录像带。这四类文字能在实验中起平衡作用，旨在控制文字出现次序及段落排序对参与者的影响。听力较好的失聪人士，不论阅读哪种文字，都比听力较差的失聪人士取得更高的平均分数。而在阅读简化版文字方面，听力较高和听力较差的失聪人士在分数上更有显著差异。上述结果应该如何解释？所有简化版的文章比原文更短，的内容是与原本一样，所以简化版应比原文包括更多潜藏的讯息。因此在阅读简化版时，读者需要预先对文章内容拥有一定的知识及本身已有一定阅读经验，以填补文字中缺少的讯息。结论是简化版文字反而未能达到它的原本功用，因为在简化的过程中同时移除了文章的部份结构，而这些结构本来有助于读者对文章的理解。

**Dutch**

[Translation Tanja Janssen]

TITEL. Dove volwassenen en teksbegrip

SAMENVATTING. In dit onderzoek is het tekstbegrip van dove proefpersonen (14-65 jaar oud) vergeleken. Iedere proefpersoon kreeg 12 teksten voorgelegd in de volgende vier condities: 1. stil lezen van een authentieke tekst, 2. bekijken van een authentieke tekst in gebarentaal op video, 3. stil lezen van een eenvoudig te lezen tekst, 4. bekijken van een eenvoudige tekst in gebarentaal op video. De condities waren counterbalanced om te controleren voor volgorde effecten. Goede dove lezers hadden een hogere gemiddelde score dan zwakke dove lezers bij alle tekstversies. Er was een significant verschil in gemiddelde scores tussen goede en zwakke dove lezers op de eenvoudig te lezen teksten. Hoe zijn deze resultaten te verklaren? Alle eenvoudig te lezen teksten waren veel korter dan de authentieke teksten. Een gevolg hiervan is dat de lezer voorkennis en leeservaring nodig heeft om de ontbrekende informatie in de tekst te kunnen aanvullen. De conclusie luidt dat de eenvoudig te lezen teksten niet aan hun doel beantwoorden, omdat door de vereenvoudiging structuren verwijderd waren die het tekstbegrip bevorderen.

TREFWOORDEN: dove lezers, tekstbegrip, zakelijke teksten, authentieke teksten, eenvoudig te lezen teksten

**Finnish**

[Translation Katri Sarmavuori]

TITTELI. KUUROT AIKUISET JA EKSPOSITORISEN TEKSTIN YMMÄRTÄMINEN

ABSTRAKTI. Tutkimus tarjoaa vertailun kuurojen osallistujien (14—65-vuotiaita) ekspositorisen tekstin ymmärtämisestä. Jokaiselle osallistujalle annettiin 12 tekstiä seuraavien neljän tilanteen mukaan: 1. Autenttisen tekstin hiljainen lukeminen 2. Autenttisen tekstin katselu videona 3. Helposti luettavan tekstin hiljainen lukeminen 3. Helposti luettavan tekstin katselu videolta. Tilanteet olivat tasapainotetut järjestyksen ja kulkureitin vaikutuksiin nähden. Hyvillä kuuroilla lukijoilla oli korkeammat keskiarvopisteet kuin huonoilla kuuroilla lukijoilla

kaikissa tekstiversioissa. Hyvien ja huonojen kuurojen lukijoiden välillä oli merkitsevä ero helposti luettavan tekstin keskiarvoissa. Kuinka tuloksia voidaan selittää? Kaikki helposti luettavat tekstit olivat paljon lyhyempiä kuin autenttiset tekstit. Kuitenkin vaikka sisällön pitää olla identtinen autenttisen tekstin kanssa, helposti luettavassa tekstissä oli paljon implisiittii tietoa. Lukija tarvitsee ennakkotietoa ja lukemiskokemusta täyttääkseen tekstin puuttuvan tiedon. Päätelmänä oli, että helposti luettava teksti ei palvele tarkoitustaan, koska yksinkertaistamisprosessissa on poistettu rakenteita, jotka ovat relevantteja helpottamaan ymmärtämistä.

AVAINSANAT: kuurot lukijat, lukemisen ymmärtäminen, ekspositoriset tekstit, autenttiset tekstit, helposti luettavat tekstit

**French**

[Translation Laurence Pasa]

TITRE. ADULTES SOURDS ET COMPRÉHENSION DES TEXTES DESCRIPTIFS

RÉSUMÉ. L'article étudie la compréhension de textes descriptifs par des sujets sourds (âgés de 14 à 65 ans). Chaque sujet a été exposé à 12 textes, selon les quatre conditions expérimentales suivantes : 1) lecture silencieuse d'un texte authentique, 2) visionnage à l'écran d'un texte authentique signé et enregistré, 3) lecture silencieuse d'un texte facile à lire, 4) visionnage à l'écran d'un texte facile à lire signé et enregistré. Ces conditions ont été contrebalancées afin de contrôler des effets de passage et d'ordre. Les bons lecteurs sourds ont obtenu un score moyen plus élevé que les faibles lecteurs sourds et ce, pour toutes les conditions. Une différence significative est apparue entre les résultats moyens des bons lecteurs sourds et des plus faibles lecteurs en ce qui concerne la lecture du texte facile. Or, comment peut-on expliquer ce résultat ? Tous les textes faciles à lire étaient beaucoup plus courts que les textes authentiques. Cependant, puisqu'ils devaient traiter du même contenu que les textes authentiques, les textes faciles contenaient davantage d'informations implicites. Par conséquent, le lecteur devait recourir à ses connaissances antérieures et à son expérience afin de compléter les informations manquantes dans les textes. En conclusion, les textes faciles à lire n'ont donc pas eu l'effet escompté puisque le processus de simplification lui-même n'a pas permis aux structures susceptibles de faciliter la compréhension de se mettre en œuvre.

MOTS-CLÉS : lecteurs sourds, compréhension en lecture, textes descriptifs, textes authentiques, textes faciles à lire.

**German**

[Translation Ulrike Bohle, Irene Pieper]

TITEL. Gehörlose Erwachsene und Verständnis von expositorischen Texten

ZUSAMMENFASSUNG. Die Studie vergleicht das Verständnis expositorischer Texte von Gehörlosen (im Alter zwischen 14 und 65 Jahren). Jeder Teilnehmer wurde 12 Texten unter den folgenden Bedingungen ausgesetzt: 1. stilles Lesen eines authentischen Textes, 2. Sehen eines auf Video aufgezeichneten gebärdeten authentischen Textes, 3. Lesen eines vereinfachten Textes ('easy-to-read text'), 4. Sehen eines auf Video aufgezeichneten gebärdeten vereinfachten Textes. Die Bedingungen wurden variiert, um Reihungs- und Gewöhnungseffekte zu kontrollieren. In allen vier Bedingungen erzielten gute Leser bessere Ergebnisse als schlechte Leser. Signifikante Unterschiede zwischen guten und schlechten Lesern ergaben sich bei der vereinfachten Textversion. Wie sind diese Ergebnisse zu erklären? Alle vereinfachten Texte waren kürzer als die authentischen Texte. Um den Inhalt mit dem der authentischen Texte identisch zu halten, wurden in dem vereinfachten Text viele Informationen implizit gegeben. Daher benötigen Leser Vorwissen und Leseerfahrung, um die fehlenden Informationen in den Text einzufügen. Die Schlussfolgerung daraus ist, dass vereinfachte Texte ihr Ziel, das Leseverständnis zu erleichtern, verfehlen, da durch die sprachliche Vereinfachung Strukturen entfallen, die wiederum das inhaltliche Verständnis erleichtern. SCHLAGWORTER: Gehörlose Leser, Textverstehen, expositorische Texte, authentische Texte, vereinfachte Texte

**Greek**

[Translation by Panatoya Papoulia Tzelepi]

Τίτλος. Ενήλικοι κωφοί και η κατανόηση κειμένων δοκιμιακού τύπου

Περίληψη. Αυτή η μελέτη παρουσιάζει σύγκριση κατανόησης κειμένου δοκιμιακού τύπου μεταξύ ενήλικων κωφών (14-65 ετών). Κάθε υποκείμενο εκτέθηκε σε 12 κείμενα κάτω από τέσσερες διαφορετικές συνθήκες. 1. Σιωπηρή ανάγνωση ενός αυθεντικού κειμένου. 2. Παρακολούθηση video απόδοσης κειμένου σε νοηματική γλώσσα. 3. Σιωπηρή ανάγνωση ενός εύκολου κειμένου. 4. Παρακολούθηση video απόδοσης σε νοηματική γλώσσα ενός εύκολου κειμένου. Οι συνθήκες αντισταθμίστηκαν ως προς τη σειρά και τα κείμενα. Οι καλοί κωφοί αναγνώστες είχαν ψηλότερο γενικό μέσο όρο από τους πτωχούς κωφοί αναγνώστες σε όλους τους τύπους κειμένων. Υπήρχε σημαντική διαφορά στο μέσο όρο των αποτελεσμάτων μεταξύ των καλών και αδύνατων κωφών αναγλωστών το εύκολο κείμενο και το video με το εύκολο κείμενο. Πώς μπορεί να ερμηνευθούν αυτά τα αποτελέσματα; Παρόλα αυτά, εφόσον έπρεπε το περιεχόμενο να είναι ταυτόσημο με τα αυθεντικά κείμενα, υπήρχαν πολλές υπόρρητες πληροφορίες στα ευκολοανάγνωστα κείμενα. Κατά συνέπεια ο αναγνώστης χρειάζεται προηγούμενη γνώση και αναγνωστική εμπειρία για να συμπληρώσει τις ελλείπουσες πληροφορίες στο κείμενο. Ένα συμπέρασμα είναι ότι τα ευκολοανάγνωστα κείμενα δεν υπηρετούν το στόχο αφού η διαδικασία της απλοποίησης έδωσε αφορμή στην απώλεια των δομών που διευκολύνουν την κατανόηση.

Λέξεις κλειδιά: Κωφοί αναγνώστες, κατανόηση της ανάγνωσης, δοκιμακό κείμενο, αυθεντικό κείμενο, ευκολοδιάβαστα κείμενα

### Italian

[Translation Manuela Delfino, Francesco Caviglia]

TITOLO. Adulti sordi e la comprensione di testi espositivi

SINTESI. Questo studio presenta un esame comparativo di comprensione di testi espositivi da parte di partecipanti sordi (14-65 anni di età). A ogni partecipante sono stati presentati 12 testi in quattro possibili condizioni: 1. Lettura silenziosa di un testo autentico. 2. Visione di un video con testo autentico letto nella lingua dei segni. 3. Lettura silenziosa di un testo semplificato. 4. Visione di un video con testo semplificato letto nella lingua dei segni. La sequenza delle condizioni è stata bilanciata per compensare effetti di sequenza e ripetizione. I buoni lettori sordi avevano un punteggio medio più alto dei cattivi lettori sordi in tutti i testi e condizioni di lettura. È stata notata una differenza significativa nei punteggi medi tra buoni lettori sordi e cattivi lettori sordi sui testi semplificati. Come si possono spiegare tali risultati? Tutti i testi semplificati erano molto più corti dei testi autentici. Tuttavia, dato che il contenuto deve essere identico a quello del testo autentico, i testi semplificati contenevano molta informazione implicita. Di conseguenza il lettore necessita di conoscenza pregressa e di esperienza di lettura per integrare l'informazione mancante nel testo. Una conclusione è che i testi semplificati non erano funzionali al loro obiettivo dal momento che il processo stesso di semplificazione ha portato all'eliminazione di strutture utili a facilitare la comprensione.

PAROLE CHIAVE: Lettori sordi, Comprensione della lettura, Testi espositivi, Testi autentici, Testi semplificati.

### Polish

[Translation Elżbieta Awramiuk]

TITUL. Niesłyszący dorośli a rozumienie prezentowanych tekstów

STRESZCZENIE. Artykuł poświęcony jest porównaniu rozumienia przez niesłyszących uczestników (14-65 lat) prezentowanych tekstów. Każdemu uczestnikowi zaprezentowano 12 tekstów z uwzględnieniem następujących czterech różnych warunków: 1. ciche czytanie autentycznego tekstu; 2. oglądanie zapisanego na wideo autentycznego tekstu w języku migowym; 3. ciche czytanie tekstu uproszczonego; 4. oglądanie zapisanego na wideo tekstu uproszczonego w języku migowym. Warunki były zmieniane, żeby kontrolować stan bieżący i efekty przejściowe. We wszystkich typach tekstów sprawni czytelnicy niesłyszący uzyskiwali wyższą ilość punktów za zrozumienie niż słabi czytelnicy niesłyszący. Istotna różnica punktowa wystąpiła między sprawnymi i słabymi czytelnikami w tekstach uproszczonych. Jak te rezultaty można wyjaśnić? Wszystkie teksty uproszczone były znacznie krótsze niż teksty autentyczne. Mimo że zawierają identyczne treści co teksty autentyczne, znajduje się w nich dużo więcej informacji implicytnych. W konsekwencji czytelnik musi wcześniej mieć pewną wiedzę i doświadczenia czytelnicze, aby zrekonstruować opuszczone w tekście informacje. Z badań wynika, że teksty uproszczone nie spełniały swej funkcji, ponieważ proces upraszczania doprowadził do usunięcia struktur istotnych dla rozumienia.

SŁOWA-KLUCZE: czytelnicy niesłyszący, rozumienie tekstu czytanego, teksty prezentowane, teksty autentyczne, teksty uproszczone

### Portuguese

[Translation Sara Leite]

TITULO. ADULTOS SURDOS E COMPREENSÃO DE TEXTOS EXPOSITIVOS

RESUMO. Este estudo estabelece uma comparação entre a compreensão de textos expositivos por parte de participantes surdos (14-65 anos de idade). Cada participante foi exposto a 12 textos tendo em conta quatro condições distintas: 1. Leitura silenciosa de um texto original. 2. Visionamento de um filme com a leitura de um texto original em língua gestual. 3. Leitura silenciosa de um texto simplificado. 4. Visionamento de um filme com a leitura de um texto simplificado em língua gestual. As condições foram contrabalançadas de forma a controlar os efeitos causados pela ordem e pela transição. Os bons leitores surdos obtiveram uma classificação média superior à dos leitores surdos menos bons em todas as versões do texto. Houve uma diferença significativa nos níveis médios entre os leitores bons e os menos bons nas versões simplificadas dos textos. Como se justificam os resultados? Todos os textos simplificados eram bastante mais curtos do que os textos reais. Porém, como o seu conteúdo tem de ser idêntico ao dos textos reais, havia muita informação implícita nos textos simplificados. Como consequência, o leitor precisa de

ter conhecimentos prévios e experiência de leitura para poder preencher a informação que falta no texto. Uma das conclusões é que os textos simplificados não cumpriram o seu objectivo, uma vez que o próprio processo de simplificação deu origem à eliminação de estruturas que são relevantes para facilitar a compreensão.

PALAVRAS-CHAVE: leitores surdos, compreensão da leitura, textos expositivos, textos originais, textos simplificados.

### Spanish

[Translation Ingrid Marquez]

TÍTULO. LOS ADULTOS SORDOS Y LA COMPRENSIÓN DE TEXTOS EXPOSITIVOS

RESUMEN. El estudio compara la comprensión de los participantes sordos (de 14-65 años) al leer textos expositivos. A cada participante se le presentaron doce textos bajo cuatro condiciones diferentes: 1. Lectura silenciosa de un texto auténtico, 2. Observación del video de un texto auténtico leído con señas, 3. Lectura silenciosa de un texto de fácil lectura, y 4. Observación del video de un texto de fácil lectura con señas. Las condiciones fueron contrabalanceadas para controlar el efecto de la secuencia y el pasaje. Los lectores sordos con buenas habilidades sacaron una calificación promedia más alta que los de habilidades limitadas en todas las versiones de la lectura. En la versión del texto fácil de leer, hubo una diferencia significativa en las calificaciones promedio entre los lectores sordos que leían bien y los que no. ¿Cómo podemos explicar estos resultados? Todos los textos fáciles de leer eran mucho más cortos que los auténticos. Sin embargo, puesto que el contenido tenía que ser idéntico, hubo mucha información implícita en la versión de fácil lectura. En consecuencia, el sujeto necesitaba conocimientos previos y experiencia como lector para llenar los vacíos de información que había en el texto. La conclusión sería que los textos de fácil lectura no cumplieron con su propósito, puesto que el mismo proceso de simplificación resultó en la omisión de estructuras que habrían facilitado la comprensión.

PALABRAS CLAVE: lectores sordos, comprensión de lectura, textos expositivos, textos auténticos, textos de fácil lectura

## 1. INTRODUCTION

Literacy skills are required every day – and daily practice of reading, writing, and calculating sustains and enforces them. Today's society is a highly technical one. Everyday examples include accessing the Internet or e-mail, reading instruction materials for computers, cars, and appliances; reading directions for assembling children's toys, travelling, cooking, or taking medications, enjoying leisure activities such as reading a book, a magazine or captions on the television (Barton, Appleby, Hodgson & Tusting, 2006; Luckner & Handley, 2008; Hermans, Knoors, Ormel & Verhoeven, 2008a).

Many readers have difficulties in understanding written texts (The National Agency for Education, 2000). One group of struggling readers is second language learners since they have to read texts in their second language. Within this group there is a sub-group of second language readers, consisting of deaf persons whose first language is Swedish Sign Language (SSL). Unlike other second language readers, SSL readers have a Swedish cultural background.

### 1.1 *Written texts are demanding*

Studies have demonstrated that many deaf persons have difficulties to understand decontextualized, abstract written language (Traxler, 2000; Karchmer & Mitchell, 2003). There are, of course, many reasons for their shortcomings. One reason is difficulties in understanding because they have reading disorders, i.e. they do not have a fluency when decoding. Another reason is that the linguistic information in the

written text is generally packed differently from that in spoken/signed language. A third reason is that written texts involve syntactic devices very seldom used in oral/signed conversation such as embedded sentence structures, explicit cohesive ties, appositive constructions, literary forms and expressions developed during a long tradition, but never heard in spoken language or used in signed language. Furthermore, more advanced syntactic ability required to parse sentences is developed through extensive reading. A large vocabulary and knowledge about the world is also developed through extensive reading (Lundberg, 2002; Bergman, 1992. See also Kelly & Barac Cikoja, 2007; Hermans, Ormel, Knoors & Verhoeven, 2008b).

It is commonplace that technological developments can be both a means of inclusion and of exclusion for disabled people. For no group it is more true than that of deaf people. The development of radio and television excluded deaf people from an activity that has become everyday and essential for most people (Pilling & Barret, 2007). Unlike the hearing first and second language readers, deaf readers are not able to listen to the radio, and for only five minutes each day is there signed news on Swedish television. Consequently deaf adults are partly excluded from accessing news; news which would probably have facilitated their comprehension of expository texts.

Studies have indicated that if deaf children are exposed at an early age to both signing and oral language they have the potential to become good readers (Harris & Moreno, 2006). Furthermore, Mayberry, Lock and Kazmi (2002) found that deaf adults who had learnt Sign Language very early, achieved as good results on reading comprehension tests as hearing adult second language learners. It was not until 1983 that it was explicitly stated that the language of instruction at school should be Swedish Sign Language, together with Swedish in its written form (Svartholm, 1998).

Swedish deaf and hearing-impaired children receive instruction in one of the country's 'special schools'. These schools offer a ten-year programme for the pupils. The compulsory school for hearing children offers a nine year programme (The National Agency for Education, 2005 html version). In school deaf students encounter many texts written in Swedish. Wauters, Tellings, Van Bon and Van Haafte (2003) found that reading materials in Dutch schools contained a higher percentage of word meanings that are probably learned via linguistic information than via perceptual information. Consequently they are very demanding for deaf students. There is no reason to believe that it would be different in Swedish reading materials.

### *1.2 Easy-to-read texts versus authentic texts*

One plausible way of providing deaf readers with access to information in books and newspapers is the use of easy-to-read materials. The opinions of second language learning theorists and researchers, however, are divided over whether to use authentic<sup>1</sup> or simplified texts for second language learners (Crossley, Louwse, McCarthy & McNamara, 2007). Supporters of authentic texts often turn to theories of cohesion, which state that language depends on cohesive devices and the more coherent

---

<sup>1</sup> *Researchers generally define an authentic text as a text originally created to fulfil a social purpose in the language community for which it was intended (e.g. Lee, 1995)*

it is, the easier it is to understand (Honeyfield, 1977; Beck, McKeown, Sinatra & Loxterman, 1991).

Because most easy-to-read texts are created using readability formulas that cut word and sentence lengths and omit connectives between sentences in order to shorten them, they lack the cohesiveness of authentic texts. Therefore, according to many researchers (e.g. Long & Ross, 1993; McNamara, Kintsch, Butler Songer & Kintsch, 1996) attempts at simplification often result in a text that is more difficult to understand than an authentic one since the process of simplification itself has given rise to the removal of structures that are relevant to facilitate understanding. It is difficult to construct a coherent representation if the text information is too skeletal and if the relations between text entities are more frequently implied rather than explicitly stated (Pretorius, 1995, 1996; Reichenberg, 2007). According to Vincent (1983) the tendency for simplified language to alter natural language redundancy can make the task of meaning making more complex for the reader.

In our country there is a resource and competence centre, *The Centre for Easy-to-Read*. The Government has drawn up their charter and appointed the Board of directors. The Board includes politicians, representatives for handicap organisations and people who are professionally devoted to culture, media or marketing.

*The Centre for Easy-to-Read* provides easy-to-read material or offers assistance when dealing with various questions relating to easy-to-read material. The easy-to-read materials address several target groups, including the intellectually disabled, or those suffering from autism or aphasia, people who are dyslexic (having difficulty in reading and writing), people who are deaf from childhood, the elderly, immigrants and school children. *The Centre* also adapts the authentic articles of a magazine called *Regionmagasinet* into an easy-to-read version. *Regionmagasinet* contains information about health care and recreation activities. It is distributed four times a year to the inhabitants in the Swedish county of Västra Götaland.

According to the home page of the Centre for Easy-to-Read :

“The aim of easy-to-read publications is to write simply and understandably... An easy-to-read text should have concrete content, usually with a simple story-line. .. The language should also be concrete. Long, unusual words should be avoided, as well as concepts that may have two meanings. ..We often choose to write two short sentences instead of using subordinate clauses. ..It is important for form and layout to be well thought through. It is easier for the reader to absorb information if text and pictures are presented as clearly and with as much space as possible. ..An easy-to-read text is thus often written with line-feeds at the end of each phrase. A new line starts at a natural point in the sentence, and always after a full stop. The reader can then make a pause at the proper place ". (*Centre for Easy-to-Read*, html version).

## 2. PILOT STUDIES

In a pilot study (Reichenberg, 2007) four deaf adults and three hearing poor readers were exposed to easy-to-read texts selected from the above mentioned *Regionmagasinet*. In the individual interviews the participants emphasized that they would

have understood the texts better if they had been signed. They found the easy-to-read texts difficult to understand because they missed a lot of information and there were many words that they did not understand. In other words the texts required a rather high proficiency in Swedish and domain-specific knowledge. The results are in line with a previous study by Reichenberg (2003), where 48 native Swedish speaking pupils with normal hearing aged 13-14 participated. One half of the participants were poor decoders and the other half were inexperienced readers. They were exposed to both authentic and easy-to-read history texts. Their comprehension did not increase when they read the easy-to-read text versions. The inexperienced readers even achieved a higher score when they read the authentic versions.

Since the above mentioned pilot study (Reichenberg, 2007) indicated that deaf orally-trained participants had difficulties to make meaning from written easy-to-read texts, one hypothesis was that young SSL-trained deaf participants would also experience difficulties in making meaning from such texts. A second hypothesis was that the young participants – since they received training not only in their second language Swedish but also in sign language linguistics in the bilingual programmes – had an advantage compared to the older participants since they did not receive training in sign language linguistics in their education - when they were presented with signed texts.

Consequently, in the present study we wanted a design that allowed comparisons of authentic and easy-to-read texts as well as comparisons of written and signed texts.

The overall aim of the present study was to investigate deaf readers' comprehension of expository texts with regard to the following four different conditions:

- 1) written authentic texts,
- 2) signed authentic texts,
- 3) written easy-to-read texts,
- 4) signed easy-to-read texts.

This design also allows for a comparison of authentic and easy-to-read texts as well as comparisons of written and signed texts.

A second aim was to compare the performance of deaf participants, who were mostly orally trained at school, with those who were SSL-trained. A third aim was to compare the performance of good deaf readers with poor deaf readers.

### 3. METHOD

#### 3.1 Participants

There were forty deaf participants in the study, 17 men and 23 women. They were: (a) teachers (n=11), (b) recreation instructors (n=5) (c) adults (n=13) from a Rehabilitation Centre, called HADAR (=HAndikapp (handicap), Datorer (computers), Arbete (work) & Rehabilitation (rehabilitation) where they attended a course in order to get a job (d) and students recruited from schools for the deaf and hard of hearing (n=11). The participants were between 14 and 65 years of age. The average age was 33, 3 years. The reason for the wide age range in the population was that it was not that easy to get participants to the study.

Some of the participants were born deaf or had had a profound hearing loss since birth. Others had become deaf or had sustained a profound hearing loss early in life. They had come into contact with Sign Language at different times. The majority of them came into contact with SSL before they were three years of age ( $n=27$ ). What the participants had in common was that they all practised SSL on a daily basis and had adopted it as their conventional mode of communication.

Of the participants 20 were mostly orally trained at school and 20 were SSL-trained. None of the SSL-trained had attended oral classes or undergone oral training. Two of the participants Joan, 38 years old, and Louise, 44 years old, had attended classes for hearing-impaired pupils.

The majority of the participants ( $n=33$ ) had parents with a native Swedish background. One of them had parents using Norwegian Sign Language and another had parents using Spanish Sign Language.

### 3.2 Instruments

Decoding ability is a key contributor to comprehension. Another contributing factor is competency in SSL. Since there were no available tools for assessing competency in SSL decoding, decoding competency had to be evaluated by hearing standards although there are limitations using these tools (see Easterbrooks & Huston, 2007). It was particularly important to have a valid and reliable assessment of word decoding since it is a key function in reading. Consequently, this function was assessed using the *Word chains* task presented in Swedish (An English version is provided by Miller Guron, 2002). This task provides a measure of word recognition efficiency in a group format without confounding from pronunciation difficulties. A word chain consists of a number of words linked together (girlchairmeat), and participants are required to identify the spaces between the words with a pencil slash (girl/chair/meat) dividing as many word chains as possible in 2 minutes. The word chains test has proven to be highly correlated with conventional word reading tests and many other more complex measures of reading ability. High scores on word chains task require fast and accurate word recognition on the orthographic stage of reading development (Høien & Lundberg, 1999). Norms based on large and representative groups were available (Jacobson, 2001).

Another key function in reading is to comprehend phrases and sentences. The participants were thus presented with a sentence chain test. In this type of test the participants are given sentences in which the sentences are not separated by spaces. Furthermore, the sentences are without capitals at the beginning and full stops at the end. The participants' task is to mark the sentence boundaries. The performance was expressed as the number of correctly divided chains within a period of two minutes. The maximum score on the word chain test was 64 and on the sentence chain test 80 (Jacobson, 2001). A third key function in reading is to comprehend sentences with precision, accuracy and fastness. This is achieved with the third test: *Which picture is the right one?* In this test the student is required to read a sentence and select the correct picture from five alternatives within a period of five minutes. The maximum score was 40. The differences between the pictures are generally small. The correct

choice however, presupposes that the pupils are able to read both the single word, as well as comprehending the grammatical structure, with precision (Lundberg, 2001).

### 3.3 Expository texts

Twelve authentic expository texts were used. The texts were taken directly from the above mentioned *Regionmagasinet*. For each of the texts the magazine also had an easy-to-read version. All texts dealt with conditions in society, e.g. the cost of health care, medicines, dental treatment, recreation activities, nutritious food for children and the importance of physical activities for children. An analysis demonstrated that the easy-to-read texts were written in accordance with the guidelines of *The Centre for Easy-to-Read*:

- 1) The easy-to-read texts were much shorter than the authentic texts. Six of them had about half as many words as the authentic texts (Table 1).
- 2) Eleven of the twelve easy-to-read texts had a shorter average sentence length than the authentic texts (Table 1). This resulted in few causal connectors and mostly no personal voice in the texts. In the authentic texts short sentences were mostly mixed with long sentences. Furthermore, in the authentic texts it was often described as to why events and ideas had happened and in what way the ideas and events were related to each other. To indicate this causal relationship the authors had often added connective markers. There was also a personal voice in the texts. Studies have demonstrated that causal connectors, and the linguistic variable voice may improve hearing students' comprehension and that the mix of long and short sentences gives the text a rhythm (Beck et al., 1991; Beck, McKeown & Worthy, 1995; Reichenberg, 2000).
- 3) The easy-to-read texts had bigger font (13,5) than the authentic texts (font 9).
- 4) The easy-to-read texts were written with line-feeds at the end of each phrase. A new line started at a natural point in the sentence, and always after a full stop.
- 5) The paper, on which the authentic texts were presented was divided in columns, with few words on each row. Only four of the easy-to-read texts had columns. None of the four easy-to-read texts had more than two columns. Four of the texts had as many as four columns with approximately five words on each row. Studies, however, have demonstrated that it is more difficult to read texts with smaller fonts and many columns because such texts have a low degree of legibility (Lundberg & Reichenberg, 2009).

Comprehension of the twelve texts was investigated by means of questions about the text. There were four questions for each text. The multiple-choice format was used partly for practical reasons, partly to avoid being unfair to those students who have difficulties expressing themselves in writing, or to those who simply dislike the thought of writing (Elley & Mangubhai, 1992). Two different types of questions were used: factual questions (where the correct alternative answer agrees, to a large extent, word for word with the text), inferential questions where the answer is not clearly expressed in the text, which means that the participant must "read between the lines".

*Table 1. Authentic texts (easy-to-read texts) Number of words, sentences and average length of sentences.*

<i>Texts</i>	<i>Words</i>	<i>Sentences</i>	<i>Average length of sentences</i>
Text 1	179 (139)	10 (11)	17,9 (12,6)
Text 2	465 (214)	30 (14)	15,5 (15,3)
Text 3	186 (121)	10 (10)	18,6 (12,1)
Text 4	389 (126)	31 (13)	12,5 (9,7)
Text 5	336 (234)	24 (15)	14,0 (15,6)
Text 6	339 (259)	25 (22)	13,6 (11,8)
Text 7	450 (318)	28 (30)	16,1 (10,6)
Text 8	468 (198)	23 (18)	20,3 (11,0)
Text 9	298 (134)	13 (12)	22,9 (11,2)
Text 10	278 (71)	21 (5)	13,2 (14,2)
Text 11	221 (85)	15 (5)	14,7 (17,0)
Text 12	479 (267)	29 (21)	16,5 (12,7)

*A questionnaire:* The participants were also presented with a questionnaire. There were questions about age, sex, ethnicity, education, reading habits, Internet use, and recreation and leisure occupations (See Appendix A).

### *3.4 Procedure*

Following the approval of the Ethic Committee, permission to conduct the research was sought from the headmasters, parents and the participants. Once permission was granted meetings were held outlining the details of the research. Participants' consents were secured by providing consent letters and consent forms.

Each participant was exposed to in all 12 texts under four different conditions: 1 = silent reading of an authentic text. 2 = viewing of a videotaped signed authentic text 3= silent reading of an easy-to-read text 4 = viewing of a videotaped signed easy-to-read text. The conditions were counterbalanced in order to control order and passage effects.

Text 1 was an authentic text version which was read silently by a subgroup of four SSL-trained participants. Text 2 presented to this subgroup was a videotaped signed authentic version. Text 3 was an easy-to-read text which was read silently and Text 4 was a videotaped signed easy-to-read version. Text 5 was an authentic version which was read silently and Text 6 was a videotaped signed authentic version etc. The next subgroup of SSL-trained participants was first provided with a videotaped signed authentic version (2), then an easy-to-read text which was read silently (3), followed by a videotaped signed easy-to-read text and then (4) an authentic text which was read silently (1). The third subgroup of SSL-trained participants were presented with the texts in the following order 3, 4, 1, 2 and the fourth subgroup 4, 1, 2, 3. This pattern was repeated for the orally trained participants.

The order between the different conditions for the subgroups and for the texts is summarised as follows: Group 1: Text 1-2-3-4; Group 2: Text 2-3-4-1; Group 3: Text 3-4-1-2; Group 4: text 4-1-2-3.

The signed versions were videotaped in advance. An advantage with videotaped signed texts is that you can have the same interpreters for all texts used. Two authorized interpreters in Swedish Sign Language (SSL) were involved. The investigator read the texts aloud and the interpreter signed them. If the first interpreter signed the first text then the other interpreter signed the second etc. Although the interpreter may be very skilled, it is important to check the interpretation to reduce the risk of misinterpretations. When a text was signed by one interpreter the other interpreter checked it over. The two interpretations were compared to each other. There was a 95 % agreement.

Four texts were dealt with each time the investigator met the participants. Just two participants were tested at a time.

The participants were presented with the questions in written Swedish and were instructed to mark with a cross the right answer. The questions were also signed in advanced –videotaped- by the same interpreters that signed the 12 texts.

Several researchers have demonstrated that a reader might fully understand what is read but fail to demonstrate that comprehension due to factors such as fatigue, memory required to answer the questions, or insufficient time (Brauer, Pollard, & Hardy-Braz, 1998; LaSasso, 1999). In order to try to eliminate such factors, the participants in this study were permitted to (a) view the videotaped signed texts and questions as many times as they wanted (b) read the written texts as many times they wanted (c) check in the texts and view the video when answering the questions.

The three tests for measuring a general base reading level were group-administrated and performed by the investigator. To avoid the risk of the participants signing to each other, a wooden curtain was placed between them.

## 4. RESULTS

In this section, firstly the results from the questionnaire, the word reading test and the sentence comprehension tests will be given, then the results from the texts read/viewed will be presented.

### 4.1 *Reading habits*

Almost half of the participants (n=15) read a novel/fiction once or twice a year and some (n=8) never read a novel. Non fiction was more popular, and was read every week/every month by almost half of the participants (n=18), once or twice a year (n=15) or never (n=5). Most of the participants (n=36) used e-mail and Internet every week. Most of them read a daily newspaper every day or almost every day (n=25). Most of them also watched TV (n=31) every day or almost every day and they also managed to read the subtitles on TV in time or almost in time (n=38). However only a minority (n=4) preferred to read books during their spare time. The majority spent time with their family, working in their gardens or participating in

sport activities during their spare time. The results of two questionnaires are missing since the participants were absent when the questionnaires were distributed.

Table 2. Results. Word chains. Max score 64. Sentence chains. Max score 80. Which picture is the right one? Max score 40. Means and standard deviations. Orally trained (n= 19) and SSL-trained (n=20).

Groups	Word-chains		Sentence- chains		Which picture?	
	M	SD	M	SD	M	SD
Orally trained	27,1	7,61	30,68	12,06	21,10	6,51
Swedish sign Language	25,8	8,66	25,10	12,03	22,00	7,04

The maximum score on the word chain test was 64, on the sentence chain test 80 and on *Which picture is the right one?* 40. There are no norms for adults on the tests. However, the norms for (age 13-14) are 26 for word chains and 34 for sentence chains. The norm for (grade 3) on *Which picture is the right one?* is 16,2. Table 2 shows the mean score on each of the three tests for the orally trained and the SSL-trained participants. An independent t-test showed that there was no significant difference in mean scores between the two groups. The orally trained group is just above the norm for the word- chain test and the SSL-group below the norm. Both groups are below the norm for the sentence chain test and above the norm for *Which picture is the right one?*

#### 4.2 The twelve texts

Originally there were four questions designated to each text (4x12=48). The participants were awarded 1 point for each correctly answered question.

Two questions had to be deleted since part of the answers to these questions was found to be in the authentic text version but not in the easy-to-read version- so the maximum score was 46. Two of the participants completed only ten texts. The missing data was imputed. The imputation was based on the mean score on the critical text version.

Table 3 shows the two groups' mean scores (orally trained and SSL- trained) on the four different text versions. There was no significant difference in mean scores between the two groups.

We also wanted to investigate poor deaf and good deaf readers' mean scores on the four different text versions. We defined poor readers as: those who scored lower than 76 points on the three tests (total sum was 184 points). (See Appendix B for each participants' total points).

Table 3. Results on each of the four text versions. Means and standard deviations. Orally trained ( $n=20$ ) and Swedish sign Language (SSL)-trained ( $n=20$ )<sup>2</sup>

	Orally trained		SSL	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Authentic text	7,8	1,9	7,9	1,9
Signed authentic text	8,0	2,2	8,0	2,5
Easy-to –read text	8,6	2,0	8,1	2,0
Signed easy- to- read text	7,9	2,2	7,1	2,6

The good readers had a higher mean score than the poor readers on all text versions (Table 4).

Table 4. Poor readers ( $n=19$ ) and good readers ( $n=20$ ) results on each of the four text versions<sup>3</sup>. Means and standard deviations

Text version	Poor readers		Good readers	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Authentic text	7,5	1,8	8,0	1,9
Signed authentic text	7,4	2,2	7,8	2,6
Easy-to –read text	7,3	1,9	9,2	1,5
Signed easy- to- read text	6,5	2,1	8,4	2,7

We performed a mixed factorial ANOVA with text type (Authentic versus Easy-to-read) and modality (Written versus Signed) as within subject factors, and reading group (Poor versus Good) as the between subjects factor. The difference in overall mean scores between good and poor readers was statistically significant,  $F(1, 37) = 4.83$ ,  $p = .034$ , partial  $\eta^2 = .115$ . In addition, there was a significant interaction effect between reading group and text type,  $F(1, 37) = 9.14$ ,  $p = .005$ , partial  $\eta^2 = .198$ . To interpret the interaction effect, paired t-tests were used. These tests showed that good readers comprehended easy-to-read-texts ( $M = 8.8$ ,  $SD = 1.8$ ) better than authentic ( $M = 7.8$ ,  $SD = 2.1$ ) texts,  $t(19) = 2.50$ ,  $p = .022$ . Among poor readers the

<sup>2</sup> Two of the participants completed only ten texts. The missing values have been imputed. The imputation was based on the mean score on the critical text version.

difference between easy-to-read-texts ( $M = 6.92$ ,  $SD = 1.52$ ) and authentic texts ( $M = 7.47$ ,  $SD = 1.53$ ) did not reach statistical significance, but there was a tendency for the reversed pattern as compared to that found for the good readers,  $t(18) = -1.75$ ,  $p = .096$ . Thus, indicating that the easy-to-read text versions were best for the good readers, and not good for poor readers. The main effect of modality (written versus signed) did not reach statistical significance, nor did any other interaction (all  $p > .05$ ).

## 5. DISCUSSIONS AND CONCLUSIONS

In this study 40 deaf participants were exposed to twelve texts under four different conditions. There was no significant difference in results between orally trained and SSL-trained when the participants were exposed to the different text versions.

When we investigated good and poor readers' results we found that the good readers had a higher mean score than the poor readers on all text versions. The difference in overall mean scores between good and poor readers was statistically significant. We also found that easy-to-read texts were best for good readers and not for the poor readers, as they were intended for. The results are in line with Burnham et al. (2008) who found that proficient deaf readers had better comprehension than did less proficient readers with greater text reduction, although the difference was not statistically significant in Burnham et al.'s study (See also Miller, 2006 and 2009).

How then can the results be explained? The easy-to-read texts were written in accordance with the guidelines of *The Easy-to-Read Centre*. Consequently the texts had big fonts with much space on each page; in other words the legibility was good. This was not the case with regard to the authentic texts. A conclusion must be drawn that legibility is a necessity, but that in itself is not sufficient in order to facilitate the reading of the text for this target group. The texts also call for a high degree of readability.

Characteristic of the easy-to-read texts were short sentences and few subordinate clauses. However, research into text comprehension and cohesive factors has shown that short sentences do not necessarily enhance comprehension and can in fact have a detrimental effect on it. A text consisting of short sentences runs the risk of poor rhythm and will, accordingly, be difficult to read, thus placing a heavier processing burden on the reader than do authentic texts (Crossley et al., 2007).

All of the easy-to-read texts were also much shorter than the authentic texts. However, since there has to be the identical content in the easy-to-read texts as in the authentic texts, there had to be a lot of implicit information in the easy-to-read texts and consequently less causal connectors. Consequently the reader needs a lot of prior knowledge to fill in the missing information in the text to be able to make meaning from it. One way of getting prior knowledge is by reading texts. However, less than half of the participants in this study read a newspaper every day or almost every day and the majority seldom read novels/fiction. Only four of the participants preferred reading books during their spare time.

In the authentic texts there were causal connectors and the personal voice, linguistic variables that probably facilitated comprehension for the poor deaf readers while the

good readers found it boring to read long, explanatory texts (See also McNamara et al. 1996 for a further discussion).

Although there are several limitations regarding this study such as: (a) the general base reading level being evaluated by hearing standards (b) too few participants, (c) too few (three) distractors in the multiple choice questions, (d) maybe the distractors were too easy to eliminate for the participants when answering the questions, four conclusions can be drawn from this study 1) Many deaf readers have probably developed a low self-esteem arising from continuous failure to understand written texts. There is a risk that they, in order, to avoid further failure, put the texts aside and stop reading them if we continue exposing the target group to “easy-to-read” texts characterized by short sentences, few causal connectors, no personal voice and much implicit information (2) It is very complicated to adapt authentic versions into easy-to-read versions intended for all people with functional impairments. They are very heterogeneous groups and each group has its special needs. Findings from this study raise questions about the appropriateness of the same easy-to-read texts for several target groups. Instead each target group would need a special easy-to-read text adapted to their special needs. (3) It is also complicated to sign from an authentic/easy-to-read version. It can be argued that signed Swedish is not the same as Swedish Sign Language (Svartholm, 1998). However, in this study it was necessary that the signed text was as similar as possible to the written text. Therefore, signed Swedish was used instead of Swedish Sign Language (see also Reichenberg, 2007). (4) It is necessary to not focus on variables within the reader, when finding that hearing adults outperform deaf adults in reading comprehension. Consequently it is important to look “outside” the reader, at the texts, to determine whether there are fairness issues for special populations, such as deaf adults (see also Lollis & LaSasso, 2009).

Many deaf adults are excluded from society and working life because they have difficulties to read and write. There is a need to break the vicious circle in which many of these poor readers are struggling. If they are to become equal members of society they must have access to materials which awaken their desire and curiosity to read. Consequently there is a need for texts which can be read by deaf adults with varying prior knowledge in written Swedish as well as in the domain-specific areas.

In a forthcoming study it would be of interest to study deaf readers’ comprehension of authentic texts with a high degree of causality and with a personal voice (see Crossley et al., 2007 and Beck et al., 1995) and easy-to-read texts. In such a study there would also be normal hearing adults and normal hearing second language readers.

#### ACKNOWLEDGEMENT:

The research was funded by Research and Development and the Disabilities Committee, in the county of Västra Götaland. I am grateful to Professor Ingvar Lundberg for valuable advice and support during the research process, as well as for his helpful comments on the manuscript.

## REFERENCES

- Barton, D., Appleby, Y., Hodgson, R., & Tusting, K (2006). *Relating adults lives and learning participation and engagement in different settings*. Literacy Research Centre. Lancaster University.
- Beck, I. I., McKeown, M. G., Sinatra, G. M., & Loxterman, J. A. (1991). Revising social studies text from a text-processing perspective: Evidence of improved comprehensibility. *Reading Research Quarterly*, 26(3), 251–276. <https://doi.org/10.2307/747763>
- Beck, I. L., McKeown, M.G., & Worthy, J. (1995). Giving a text voice can improve students' understanding. I: *Reading Research Quarterly*. 30(2), 220–238.
- Bergman, B (1992). Teckenspråket -ett svenskt minoritetsspråk. Forskning om teckenspråk. [Sign Language – a Swedish minority language. Research on Sign Language]. Stockholm:Institutionen för lingvistik, Stockholms universitet.
- Brauer, B., Braden, J., Pollard, R., & Hardy-Braz, S. (1998). Deaf and hard of hearing people. In J. Sandoval, C. Frisby, K.Geisinger, J. Scheuneman, & J. Ramos Grenier (Eds.), *Text interpretation and diversity: Achieving equity in assessment* (pp297-315). Washington DC:American Psychological Association. <https://doi.org/10.1037/10279-011>
- Burnham, D., Leigh, G., Noble, W., Jones, C., Tyler, M., Grebennikov, L., & Varley, A., (2008). Parameters in television captioning for deaf and hard-of-hearing adults: effects of caption rate versus text reduction on comprehension. *Journal of Deaf studies and Deaf Education*, 13(3), 391-404. <https://doi.org/10.1093/deafed/enn003>
- Crossley, S.A., Louwse, M.M., McCarthy, P.M., & McNamara, D.S. (2007). A linguistic analysis of simplified and authentic texts. *The Modern Language Journal*, 91, 15-30. <https://doi.org/10.1111/j.1540-4781.2007.00507.x>
- Easterbrooks, S.R. & Huston, S. (2008). The signed reading fluency of students who are deaf/hard of hearing. *Journal of Deaf Studies and Deaf Education*, 13( 1), 37-54. <https://doi.org/10.1093/deafed/enm030>
- Elley, W. B. & Mangubhai, F. (1992). Multiple-choice and open-ended items in reading tests: Same or different. I: A. Lewy (Ed.), *Studies in Educational Evaluation*, 18(2), 191–199. Oxford: Pergamon Press.
- Harris, M. & Moreno, C. (2006). Speech reading and learning to read: a comparison of 8-year-old profoundly deaf children with good and poor reading ability. *Journal of Deaf Studies and Deaf Education*, 11(2), 189-201. <https://doi.org/10.1093/deafed/enj021>
- Hermans, D., Knoors, H., Ormel, E., & Verhoeven, L. (2008a). The relationship between the reading and signing skills of deaf children in bilingual education programs. *Journal of Deaf Studies and Deaf Education*, 13(4), 518-530. <https://doi.org/10.1093/deafed/enn009>
- Hermans, D., Ormel, E., Knoors, H., & Verhoeven, L. (2008b). Modeling reading vocabulary learning in deaf children in bilingual education programs. *Journal of Deaf Studies and Deaf Education*, 13(2), 155-174. <https://doi.org/10.1093/deafed/enm057>
- Honeyfield, J. (1977). Simplification. *TESOL Quarterly*, 11, 431-440. <https://doi.org/10.2307/3585739>
- Høien, T., & Lundberg, I. (1999). *Dyslexi*. Stockholm: Natur och Kultur.
- Jacobsson, C. (2001) *Läskedjor*. [Reading chains; in Swedish]. Stockholm:Psykologiförlaget.
- Karchmer, M., & Mitchell, R. (2003). Demographic and achievement characteristics of deaf and hard of hearing students. In M. Marschark & P. Spencer (Eds.), *Oxford handbook of deaf studies, language, and deaf education* (pp 21-27). New York: Oxford University Press.
- Kelly, L.P. & Barac Cikoja, D. (2007). The comprehension of skilled deaf readers. The roles of word recognition and other potentially critical aspects of competence . In K. Cain & J. Oakhill (Eds.) *Children's comprehension problems in oral and written language. A cognitive perspective*. New York: Guilford Press, pp 244-280.
- LaSasso, C. (1999). Test-taking abilities:A missing component of the curriculum for deaf students. *American Annals of the Deaf*, 144, 35-43. <https://doi.org/10.1353/aad.2012.0194>
- Lee, W.Y. (1995). Authenticity revisited. Text authenticity and learner authenticity. *ELT Journal*, 49, 323-328. <https://doi.org/10.1093/elt/49.4.323>
- Lollis, J., & LaSasso, C. (2009). The appropriateness of the NC state-mandated reading competency test for deaf students as a criterion for high school graduation. *Journal of Deaf studies and Deaf Education*, 14, 76-98. <https://doi.org/10.1093/deafed/enn017>

- Long, M. H., & Ross, S. (1993). Modifications that preserve language and content. In M. Tickoo (Ed.), *Simplification: Theory and applications*. [pp 29-52]. Singapore: SEAMEO Regional Language Centre.
- Luckner, J.L., & Handley, C.M. (2008). A summary of the reading comprehension research undertaken with students who are deaf or hard of hearing. *American Annals of the Deaf*, 153(1), 6-34. <https://doi.org/10.1353/aad.0.0006>
- Lundberg, I. (2001). *Vilken bild är rätt?* [Which picture is the right one?]. Stockholm:Natur och kultur.
- Lundberg, I. (2002). The child's route into reading and what can go wrong. In *Dyslexia*, 8, 1-13. <https://doi.org/10.1002/dys.204>
- Lundberg, I., & Reichenberg, M. (2008). Vad är lättläst? [What is meant by easy-to-read texts? Härnösand: Specialpedagogiska skolmyndigheten. 2nd edition.
- Namara, D. S., Kintsch, E., Butler Songer, N., & Kintsch, W. (1996). Are good texts always better? Interactions of text coherence, background knowledge, and levels of understanding in learning from text. *Cognition and Instruction*, 14(1), 1-43.
- Mayberry, R.I., Lock, E., & Kazmi, H. (2002).Linguistic ability and early language exposure. *Nature*, 417(2), 38. <https://doi.org/10.1038/417038a>
- Miller Guron, L. (2002). *Aspects of cross-linguistics influence on phonological processing in word reading*. Göteborg: Department of psychology. Göteborg University.
- Miller, P. (2006). What the visual word recognition skills of prelingually deafened readers tell about their reading comprehension problems. *Journal of Developmental and Physical Disabilities*, 18(2), 91-121. <https://doi.org/10.1007/s10882-006-9002-z>
- Miller, P. (2009). The nature and efficiency of the word reading strategies of orally raised deaf students. *Journal of Deaf Studies and Deaf Education*, 14(3), 344-361. <https://doi.org/10.1093/deafed/enm044>
- Pilling, D., & Barret, P. (2007). Text communication preferences in deaf people in the United Kingdom. *Journal of Deaf Studies and Deaf Education*, 14, 92-103. <https://doi.org/10.1093/deafed/enm034>
- Pretorius, E. (1995). Reading between the lines: causal connectivity, inferences and implicitness in texts. *South African Journal of Linguistics, Supplement* 26, 3-24. <https://doi.org/10.1080/10118063.1995.9724002>
- Pretorius, E. (1996). A profile of causal development amongst ten-year-olds: Implications for reading and writing. *Reading and Writing*, 8(5), 385-406.
- Reichenberg, M. (2000). *Röst och kausalitet i lärobokstexter. En studie av elevers förståelse av olika textversioner*. [Voice and causality in textbooks. A study of students' comprehension of different versions of Swedish texts]. (Göteborg Studies in Educational Sciences 149). Göteborg:Acta Universitatis Gothoburgensis.
- Reichenberg (2003). Är lättlästa texter verkligen lättlästa? [Are easy-to-read texts really that easy? ]. *Språk och lärande. Rapport från ASLA:s höstsymposium Karlstad, 7-8 november 2002*.
- Reichenberg, M. (2007). Deaf adults and easy-to-read-texts. Peer-reviewed conference paper for the Conference 'The timed are changin':researching transitions in lifelong learning. CRL 4th Biennial International Conference, 22-24 June, 2007. University of Stirling, Scotland.
- Svartholm, K. (1998). 'Bilingual education for the deaf: Evaluation of the Swedish model.' in The Centre for easy-to-read. Retrieved on March 29, 2009, from <http://www.llstiftelsen.se/stiftelsen/english/index.html>
- The National Agency for Education (2000). *The Foundation for lifelong learning*. Skolverkets rapport 180.
- The National Agency for Education (2005). *The Swedish School System*. Retrieved on March, 29, 2009, from <http://www.skolverket.se/sb/d/374>
- Traxler, C. (2000). The Stanford Achievement Test, 9th Edition: National norming and performance standards for deaf and hard of hearing students. *Journal of Deaf Studies and Deaf Education* 5, 337-348. <https://doi.org/10.1093/deafed/5.4.337>
- Vincent, M. (1983). Writing non-fiction readers. In R.R. Jordan (Ed.), *Case studies in ELT* (pp170-178). London: Collins ELT.
- Wauters, L. N., Tellings, A. E. J. M., Van Bon, W. H. J., & Van Haaften, W. A. (2003). Mode of Acquisition of word meanings: The viability of a theoretical construct. *Applied Psycholinguistics* 24, 385-406. <https://doi.org/10.1017/S0142716403000201>

## APPENDIX A

## Questionnaire

Name

Male

Female

1. When were you born?
2. What language did you learn first?
3. How old were you when you began using sign language?
4. What language do you use at home?
5. Can you lipread?
6. How many years have you gone to school?
7. What education do you have?

Mark one of the following items

8. How often do you read novels/fiction?
  - (a) Once a week
  - (b) Every month alt. Once a month
  - (c) A couple of times a year
  - (d) Never
9. How often do you read non-fiction?
  - (a) Once a week
  - (b) Every month alt. Once a month
  - (c) A couple of times a year
  - (d) Never
10. How often do you use E-mail and/or the Internet?
  - (a) Once a week
  - (b) Every month alt. Once a month
  - (c) A couple of times a year
  - (d) Never
11. How often do you read a daily newspaper?
  - Every day
  - Almost every day
  - Once a week
  - Occasionally
  - Never
12. What newspaper do you read?
13. How often do you watch TV?
  - Every day

Almost every day  
Once a week  
Occasionally  
Never

14. Do you manage to read the subtitles on TV?

Always  
Almost always  
Occasionally  
Never

15. What do you prefer to do during your spare time?

## APPENDIX B

*Table A:1. Each participant's total points on the three tests<sup>4</sup>*


---

Tricia	67	14 years
Rose	99	15 years
Monica	92	16 years
Amy	77	16 years
Lisa	83	16 years
Danny	61	16 years
John	56	16 years
Lilian	78	16 years
Susy	39	16 years
Niel	42	16 years
Peter	38	17 years
Roger	67	21 years
Kim	70	22 years
Margaret	97	22 years
Emily	103	23 years
Felicia	114	23 years
Lily	44	25 years
Jennifer	90	25 years
Jeremy	54	25 years
Joe	90	28 years
Una	66	33 years
Matthew	45	34 years
Terry	84	35 years
Henriette	103	37 years
Joan	117	38 years
Melissa	109	39 years
Elsa	85	43 years
Andy	53	44 years
Louise	88	44 years
Marjorie	48	44 years
Kathy	59	46 years
Evelyn	87	47 years
Olof	75	48 years
George	95	48 years
Jack	54	57 years
Ellen	78	59 years
Vilma	66	62 years
Jimmy	72	64 years
Stephen	73	64 years

---

<sup>4</sup> *The names of the students are fictional.*