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An Illustrated Technical Text in Translation

Choice Network Analysis as a Tool for Depicting Word-Image Interaction

Abstract

The present study inquires into word-image interaction in the translation process of illustrated technical texts. The method employed for this purpose is Choice Network Analysis, which compares the translations of the same source text by multiple translators in order to empirically derive *the options*, the set of possible solutions, that are available when translating each verbal item. The data of the study consists of eight translations of an illustrated technical text, produced by a group of Master's level translations students. The study sets out to assess if the options offered by the multimodal source text are based entirely on verbal information or on a negotiation of meaning from two different modes. The analysis implies that visual information could modify verbal information; in the most extreme cases, visual information could cause verbal information being disregarded altogether. This indicates that images can reattribute the meaning of verbal items in translation.

1 Introduction

Illustrated texts consist of words and images and are hence multimodal: their message is created in the interplay of two separate modes. Even though translating illustrated texts is commonplace for translators, translation studies have until very recently only examined the verbal dimension of translation (O'Sullivan 2013: 2-3), insinuating, perhaps, that translators only process verbal information. However, a broad range of research has established that when reading an illustrated text, readers process both words and images, and form their interpretation of the multimodal text based on both verbal and visual information (see e.g. Connors 2013; Youngs/Serafini 2013; Schnotz/Kürschner 2008; Schnotz/Bannert 2003; Mayer 2002, 2005; Wasylenky/Tapajna 2001; Hegarty/Just 1993). As translators, too, start their work as readers, one might suggest that the same argument holds for a translator's interpretation of a multimodal source text combining words and images. However, the argument remains empirically unexplored.

The present study examines how translators process the combination of words and images – referred to in this study as *the verbal source text* and *the visual source text* – when translating illustrated technical texts. The definition of an illustrated technical text

adopted in the article builds on Byrne's description of technical texts: *illustrated technical texts* here refer to informative, instructive texts that explain how something works by both verbal and visual means (Byrne 2012: 26-28). Even though technical texts constitute a significant number of the texts being translated today and even though illustrations are an integral feature of technical documents (Byrne 2012: 6, 26, 54), research into the translation of illustrated technical texts has mainly focused on providing criteria for appropriate image selection in technical and scientific texts (Tercedor-Sánchez/Abadía-Molina 2005) and technically oriented multimodal terminological databases (Prieto Velasco 2009, 2012). Translation studies has yet to assess if and how images and image-word interaction are involved in the translator's interpretation of the source text and, consequently, translation solutions.

This article sets out to test one possible method of inquiring into the effect of word-image interaction on the translator's choices and the cognitive processing underlying the translation of illustrated texts, namely Choice Network Analysis (CNA), introduced by Campbell (2000a,b; see also Campbell/Hale 2002). CNA operates on the principle that comparing the translations of the same source text by multiple translators enables us to determine the different ways in which the same text may be interpreted. In CNA, different translation solutions are collected into a network-like flowchart in order to identify the similarities as well as the differences between them. The translation solutions that were employed by the particular group of translators are referred to as *options*. In the framework, the options are taken to represent the possible translation solutions that were available to the translators when translating a specific source text item (Campbell/Hale 2002: 18). This idea may be complemented by adding that it is obviously possible that the translators considered other possible solutions before settling on a particular option. One could therefore postulate that the options, the translation solutions that were actually employed by the translators, represent the translation solutions that the translators considered to be the most appropriate for the given context.

Applying CNA to a number of translations of the same illustrated text reveals the options that the multimodal source text offered for the translators, or the range of the possible ways in which the particular group of translators extracted information from the combination of words and images. This study is interested in examining if the multimodal source text – the verbal text combined with the illustrations – offers options that the verbal text on its own does not. In other words, the study aims to determine if the images can affect the way in which the verbal text is translated. The study is a part of a larger research project investigating illustrated technical texts. The following section provides an overview of the research project, outlining its background and objectives and summarizing its findings so far.

2 Overview of the Research Project

The study presented in this article is a part of a research project investigating how visual information is involved in the translation process of an illustrated technical text. The

research data of the project comprises two parts. The first part consists of eight translations of an illustrated technical text, analyzed in this article. The second part of the data consists of translation diaries – individual, reflective accounts on the problems encountered during the translation assignment, the strategies employed to solve these problems, and so on – analyzed in a previous article (Ketola 2015). The data was produced by a group of Master's level translations students at the University of Tampere, Finland, during a specialized technical translation course from English to Finnish. The students were given one week to complete the translation assignment. In order to guarantee an unaffected reaction towards the images, the students were not informed of the aim of the research prior to the translation assignment. The use of dictionaries and parallel texts was allowed and encouraged. After the students handed in their translations and translation diaries, a group interview was conducted, during which the aim of the research was made known.

The source text for the translation assignment presented the illustrated operating principles of two different types of wet magnetic separation devices, concurrent and counter-current wet magnetic drum separators, used in the mining industry for ore beneficiation. The source text was presented as a chapter of a mining engineering text book. It consisted of just over 500 words and two large colored images. In order to assess just how much the visual information may guide the translation process, the relationship between the words and the images of the source text had been modified in certain parts so that the information conveyed by the two modes is, in one way or another, *asymmetrical*. These modifications can be seen in figure 1.

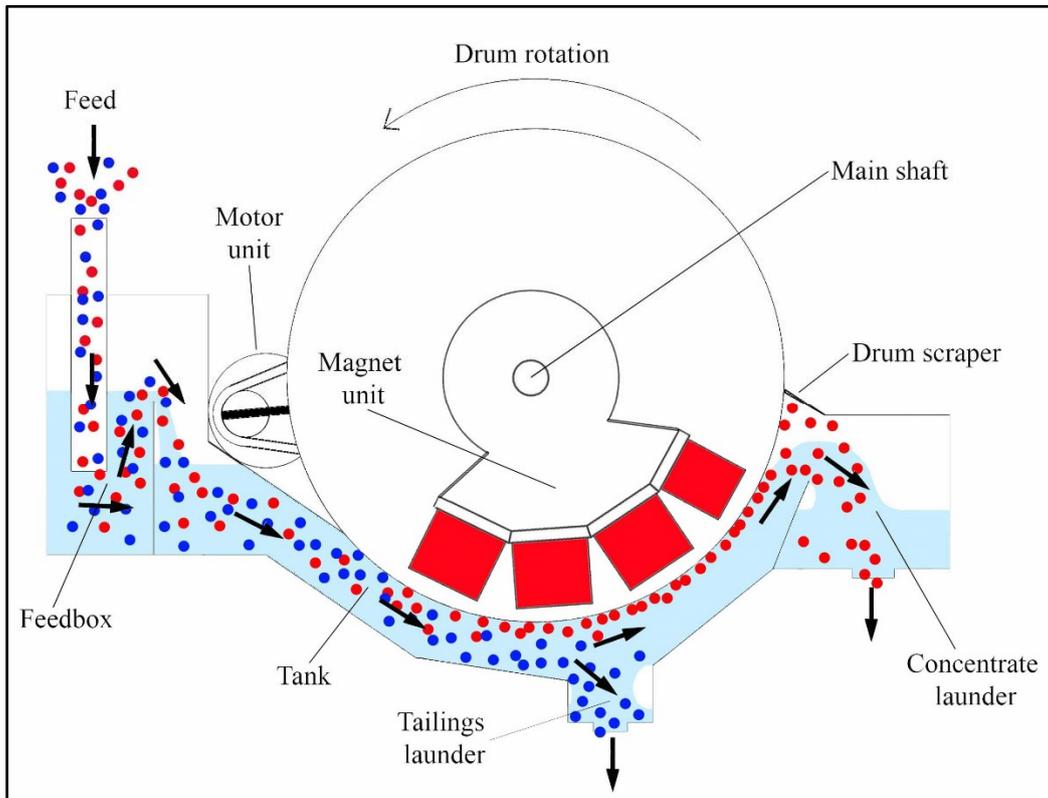


Fig. 1: The first image of the source text, representing the operating principle of a concurrent wet magnetic drum separator.

In two parts of the source text, the words and images of the source text were modified so that the information provided by the two is contradictory: the verbal text states that the drum of the device (the large circular part in the middle of the device) is submerged under water, while only the bottommost part of the drum is under water in the image. Further, the verbal text states that a part of the device, a *tailings launder*, is located in the *upper* part of the device while, according to the image, the part is located at the bottom of the device. Some of the parts of the machine were also reshaped in the image so that they no longer corresponded to their verbal definitions. An example of this is a part called *launder*: while the term typically refers to a trough or a narrow channel, the launders of the equipment are presented in the image as nearly square.

Further, in the second image of the source text (not displayed in the present article), some of the visual information was deleted from the image: the verbal text accurately described a particular part of the operating process (tailings or nonmagnetic particles exiting the separator) but the corresponding information could not be found in the image. These modifications were made in order to make it easier to distinguish which mode the translators based their translations on; had the visual and verbal modes expressed precisely corresponding information, it would have been considerably more difficult to

determine which mode the translator considered to be of more relevance during translation.

Ketola (2015) analyzed the translation diaries produced during the particular translation assignment. Even though the students were not instructed to inspect or comment on the images of the source text, issues related to the images, the asymmetry of information between words and images in particular, were widely discussed in the diaries. Only one of the translators did not discuss the images at all in the translation diary. Yet, in the group interview, this translator reported having studied the images before reading the verbal source text for the first time, but having disregarded the images when performing the actual translation. As for the rest of the group, the analysis of the translation diaries indicated that visual and verbal information challenging or contradicting each other had disturbed the translation process considerably. The analysis concluded that the students had repeatedly inspected the images during the translation assignment, which could be interpreted as visual information constituting a relevant part of the source text. The present article now sets out to determine which solutions they actually employed in their translations.

3 Choice Network Analysis

Choice Network Analysis (CNA) compares the translations of the same source text by multiple translators in order to construct models of the cognitive processing underlying translation. CNA is introduced both as an alternative and a complement to other research methods used for inferring these models, such as think-aloud protocols which, while being rich sources of information, are unable to access processing that is automatized (Campbell 2000a: 30) or, one might add, otherwise beyond conscious attention. CNA builds on the premise that while we cannot directly observe cognitive processing, we can infer a model of this processing from its results, meaning translations (Campbell 2000a: 33).

In CNA, a network-like flowchart, or a *choice network*, is constructed by comparing and classifying the different translation solutions produced by a number of translators for a source text segment. The size of the analyzed segment is determined by the aim of the research (Campbell 2000a: 38): it can be an individual word (e.g. Campbell/Hale 2002: 21-22), a string of several words (e.g. Campbell 2000a: 34) or even an entire phrase (e.g. Pavlović 2007: 164-166). Figure 2 represents an example choice network from the data (discussed in more detail later in the article) which displays the translations for the prepositional phrase *through an overflow*.

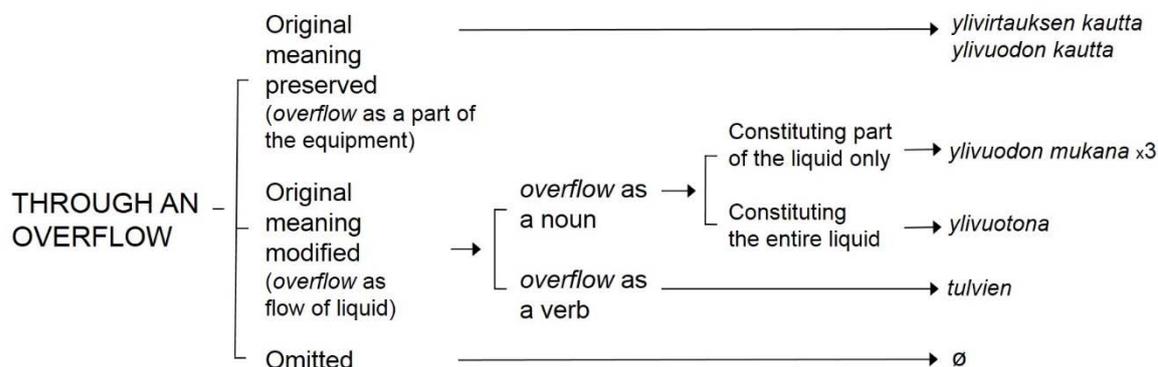


Fig. 2: Choice network of the prepositional phrase *through an overflow*.

The choice network represents all the solutions produced by the particular group of translators or *the options* that the source text offered for the group. The network can therefore be used to make general inferences about what went on in the translators' minds or, as Campbell puts it, "the processes that typically operate in particular type of subjects translating particular kind of texts under specific conditions" (Campbell 2000a: 31). These inferences can subsequently be used to construe more general principles about cognitive processing or to be used as hypotheses in the examination of other texts (Campbell 2000a: 32). An obvious limitation of CNA, as remarked by Pavlović, is that CNA on its own only displays the various possible results of the translators' decision-making process but not the reasons behind these solutions (Pavlović 2007: 178-179). However, this is compensated for in the present article – at least in part – by comparing the choice networks with the insights provided by the analysis of the translation diaries, in which the translators reflect upon the choices they made during translation.

Applying the method to the data of the present study enables two things: First of all, it allows to establish which options this particular multimodal source text offered for these particular translation students, or to establish "the potential pathways" (Campbell 2000a: 33) that the multimodal source text offered for the group. The close comparison of the different translation solutions invites us to reflect on the motives behind the solutions. The present article is interested in considering if the translation solutions seem to be based on purely verbal information or on a negotiation of meaning from two different modes, in other words, considering if the word-image interaction in the source text offered options not available from the verbal text alone. Secondly, on a more general level, applying the method to the data of the study enables us to construe more general principles about the cognitive processing taking place during multimodal text comprehension. The analysis reveals the range of the possible ways in which the particular group of translators interpreted the source text, in other words, extracted information from the combination of words and images. For this reason, the analysis may provide detailed empirical information about how the comprehension of a multimodal text unfolds – information which surely has applications even outside the immediate context of translation.

4 Data Analysis

This section of the article presents the analysis of the data. First, the section introduces a selection of five choice networks that are representative of the aims of the paper and discusses how they may be interpreted. The section then recapitulates the results of the analysis, compares them to the observations made during the analysis of the translation diaries and discusses what may be inferred about the cognitive processing underlying the translation of this particular multimodal text. The final part of the section evaluates the practicability of the method by discussing its advantages and disadvantages.

Campbell does not provide instructions on how the choice network analysis of a text segment should be performed in practice – the execution may obviously be designed to best suit the aims of the analysis. As mentioned above, choice network analyses in previous research have ranged from individual words to entire phrases. For the purposes of the present research – in which the individual translation solutions are meticulously compared – the verbal source text was divided into relatively small segments; in fact, all of the networks introduced as examples represent either prepositional phrases or compound nouns. In most of these networks, each segment has been further divided into smaller items: either individual words or chains of a few words. In practice, this division was decided on in a case-by-case basis, depending on what seemed logical when taking into consideration the structure of both languages involved. Each example first presents the phrase from which the analyzed segment has been extracted, with the analyzed segment in bold, followed by the choice network constructed of its translations.

4.1 Choice Network Analyses of the Data

Example 1: The magnetic particles are separated from the rest of the stream as they adhere to the drum surface **in the area of the magnet**.

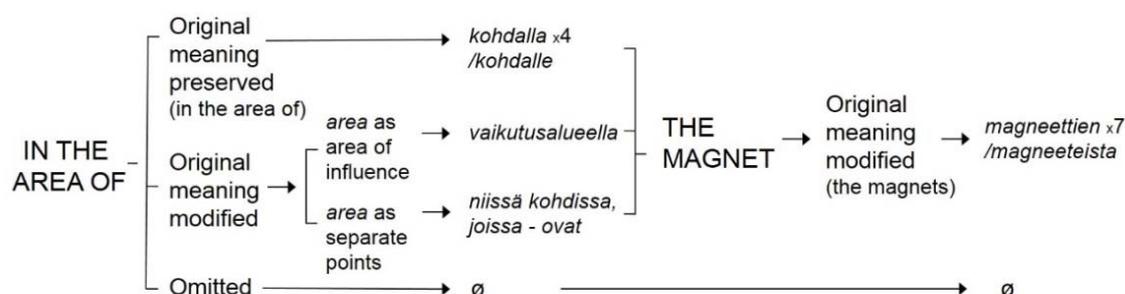


Fig. 3: Choice network of the translations of the prepositional phrase *in the area of the magnet*.

Figure 3 illustrates how the visual source text may affect the choice between singular and plural forms of nouns. The figure presents the choice network of the translations of the prepositional phrase *in the area of the magnet*. In other words, the network presents the options that the multimodal source text offered for the translation of the particular

prepositional phrase. In the choice network, the prepositional phrase has been divided into two items, *in the area of* and *the magnet*, which are analysed separately. The choice network of the prepositional phrase shows that one of the translators omitted the prepositional phrase altogether.

When looking at how the first item was translated, we can see that five translators employed a translation solution that could be described to preserve the original meaning of the item (*kohdalla* by four translators and *kohdalle* by one, differentiated only by the Finnish case suffixes [-lla, -lle] which correspond to prepositions). Two translators modified the meaning of the item: one translator formulated the item as *vaikutusalueella* 'in the area of influence [of the magnets]'. This translation solution may be considered to explain the physical operating principle of the magnet slightly further and it therefore reflects that the translator comprehended this part of the operating process well. The other translator formulated the item as *niissä kohdissa, joissa [magneetit] ovat* 'in the points where the [magnets] are'. The translation solution is a little misleading, since it does not convey the idea of a continuous magnetic field generated around the individual magnets. Comparing the translation solution with how this part of the process is presented in the image (see figure 1), one could claim that the solution reflects particularly well how the translator interpreted the verbal information by comparing it to the information provided by the image; an argument which may be supported by asking if the translator would have ended up with this solution had the source text not contained any images.

The right-hand side of the choice network displays the translation solutions for the latter item, *the magnet*. Of particular interest in this part of the network is the choice between singular and plural forms of nouns. The word is in the singular form in the verbal source text since it refers to the magnet unit of the separator as a whole. Yet, the visual source text clearly shows how the magnet unit consists of four individual magnets, colored with the same bright red as the dots representing the magnetic particles, hence emphasizing their connectedness. The choice network shows that all seven translators who preserved the prepositional phrase translated *magnet* in the plural form. It hence seems that the most obvious option the multimodal source text offered for the translators was in fact referring to the magnet in the plural form. The reason for this could well be that the visual source text so clearly depicts a series of four individual magnets. Again, it is quite unlikely that the translators would have ended up with this choice of words by interpreting verbal information only.

A similar example of how the visual source text may affect the choice between singular and plural forms of a noun could be seen in the choice network of a phrase describing how the ore particles are washed off the surface of a drum with *water sprays*. Yet, the corresponding part in the visual source text (not displayed in the present article) shows only one water spray showering water on the drum. The choice network of the phrase indicated that the multimodal source text offered three different options for the translation of *water sprays*: one translator omitted it, three translators translated it in the plural form (preserving the original meaning), and four translated it in the singular form.

Example 2: The weakly magnetic and non-magnetic particles are carried forward by the stream and eventually discharged from a tailings launder **in the upper part of the equipment**.

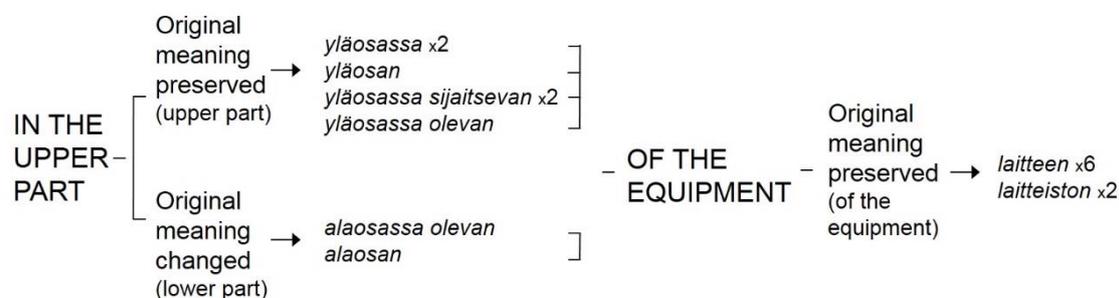


Fig. 4: Choice network of the translations of the prepositional phrase *in the upper part of the equipment*.

Figure 4 represents a part in the multimodal source text in which the relationship between the two modes was modified so that they provide contradictory information: according to the verbal source text, *the tailings launder* is located in the upper part of the equipment while, according to the visual source text (figure 1), the part is one of the bottommost parts of the device. As could, perhaps, be expected, the multimodal source text offered the translators two opposing options as to the location of the launder: the upper or the lower part of the device. The choice network shows that six translators decided to preserve the original meaning of the item, in other words, convey the information offered by the verbal source text (*yläosassa* ‘in the upper part’, *yläosan* ‘of the upper part’ or similar). Two translators radically restructured the original meaning of the item by conveying the information offered by the visual source text (*alaosassa olevan* ‘located in the lower part’, or *alaosan* ‘of the lower part’). This is quite an obvious example of the multimodal source text offering options that the verbal text on its own does not.

The fact that only two translators conveyed the location of the part as expressed by the visual source text is somewhat surprising taking into consideration that most translators (all seven who actually employed visual information during translation) discussed this contradiction of information in their translation diaries and most commonly reported it as a mistake in the verbal source text. The fact that they did not “correct this mistake” in their translations could well be due to insecurity: as several of them commented in their diaries, they felt like their background knowledge of the somewhat complex technical topic did not entitle them to change the verbal text. In other words, even though they identified the item as mistaken, they seemed to esteem the integrity of the verbal source text too much to change the item to what they in fact believed was correct.

The second example of contradiction between word and image had to do with the verb *submerge*: the verbal text expressed that the drum of the device is “submerged in a tank” – in other words, sunk below the surface of water – while, according to the image,

only the bottommost part of the drum is under water (see figure 1). The choice network of the particular phrase revealed that the multimodal source text offered basically two options for the verb *submerge*, one of which conformed to the verbal source text item somewhat literally (*upottaa* 'submerge', 'sink'). The other, only employed by one of the translators, expressed that the drum is 'placed' in a tank (*sijoittaa*), which is roughly the same idea on a more general level. According to the analysis of the translation diaries, only two translators noticed the contradiction, one of whom decided not to change the wording. The other six translators affirmed in the post-translation group interview that they had not noticed the contradiction. This illustrates that the process of multimodal meaning construction is, in fact, quite indeterminable: the multimodal source text may offer differing options but these options are not always noticed by the translator.

Example 3: The non-magnetic particles flow in the opposite direction to the drum rotation and are discharged **through an overflow** into a tailings chute.

Figure 2, presented above in section 3, illustrates how the lack of visual information may affect the way in which the translator interprets the verbal source text. The example represents a part in the source text describing how the stream of the non-magnetic particles exits the separator after being separated from the stream of the magnetic particles; the two streams continue their journeys in opposite directions and exit the separator from separate outlets. While the verbal source text accurately describes the particular part of the operating process, the corresponding information cannot be found in the image (not displayed in the present article): the non-magnetic particles are not depicted in the image beyond the point where they separate from the magnetic ones. The *overflow* or the outlet through which the particles exit the separator can be seen in the image, but unlike in the first image of the source text (figure 1), the names of the parts of the equipment have not been labeled in the image corresponding to this part of the operating process. Moreover, the *tailings chute* (analyzed below in example 5) through which the particles continue their journey is not depicted in the image at all.

Figure 2 represents the choice network of the prepositional phrase *through an overflow*. The term *overflow* can refer to both the flowing over of a liquid (either as a noun or a verb) or, as in this particular text, an outlet for excess liquid. As the network displays, the source text offered the translators six different options for the translation of the prepositional phrase. Two of the translators produced a solution which conformed to the original meaning of the phrase (the uppermost solutions in the figure), in other words, convey the idea of an overflow as a part of the equipment. Both *ylivirtaus* and *ylivuoto* (which take the forms of *ylivirtauksen* and *ylivuodon* after being conjugated to the genitive case required by following postposition *kautta* 'through') are synonyms which refer to a passage in a machine through which excess liquid is let out. However, five translators employed a translation solution which describes *overflow* as flow of liquid, either as a noun or as a verb (e.g. 'discharged as overflow', 'by overflowing'). While these translation solutions are not necessarily erroneous, by failing to mention the particular part of the equipment they do not describe the operation process as accurately as could be

expected of a mining engineering text book. Taking into account that the particles are not depicted as exiting through this particular part of the equipment and that the names of the parts of the equipment were not labeled in the particular image, one could suggest that due to the lack of visual information, the translators had trouble understanding what *overflow* referred to exactly in this particular text. As may be seen from the choice network, one translator omitted the prepositional phrase altogether. This, too, could be indicative of having had trouble understanding the phrase.

Example 4: The weakly magnetic and non-magnetic particles are carried forward by the stream and eventually discharged from **a tailings launder** in the upper part of the equipment.

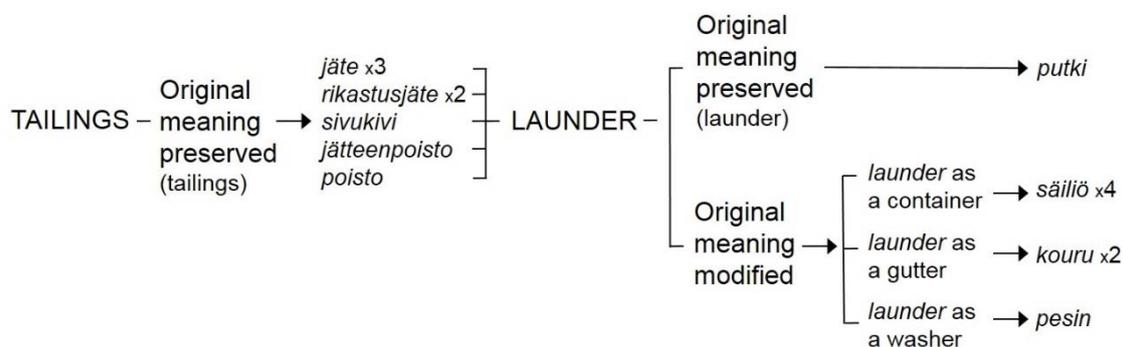


Fig. 5: Choice network of the translations of the term *tailings launder*.

The term *launder* is repeated various times in the source text because there are three separate launders in the separators introduced. In the subject area, the term typically refers to a long narrow channel or a trough used to convey liquids in a vertical direction. Yet, the shape of the launders was modified in the visual source text: they are depicted in the image as slightly wider than they are tall (see, for instance, the *concentrate launder* and *tailings launder* in figure 1). Figure 5 presents the choice network of the translations of term *tailings launder*. The translations for *tailings* are all acceptable near-synonyms and will not be analyzed here because they are not related to the research question of the article. As may be seen from the network, the multimodal source text offered four different options for the translation of *launder* (the exact same translation solutions were employed for the other launders mentioned in the source text as well). Only one of the options (*putki* ‘pipe’) clearly preserves the meaning of the verbal source text item; in other words, it describes a trough which could convey liquid in a vertical direction. Perhaps not surprisingly, this translation solution was employed by the translator who reported not having looked at the illustrations during translation.

The remaining seven translators employed a translation solution that did not entirely preserve the original meaning of the verbal source text item. Four of them translated the term as *säiliö* ‘container’. In the translation diaries, one of them explained the rationale behind the translation solution, stating that “container” was a simple choice of words

“since it is so generic it can be of any shape at all” (Ketola 2015: 28). Here the suitability of the translation solution is assessed in relation to the shape of the part in the visual source text. The problem with this translation solution is that a container is used to contain or hold something; the term does not convey the idea of channel through which liquid passes. One could hence suggest that for these four translators, it was more important to make the translation solution conform to the shape of the part in the image than to conform it to its function. Two of the translators translated the term as *kouru*, the closest English translation for which would be “gutter”. *Kouru* commonly describes a groove or a furrow that is open from the top (Grönros et al. 2012). Since the part of the equipment in question conveys water in a *vertical* direction, this translation may be considered as unfit for the given context.

Lastly, one translator ended up translating the term as *pesin* ‘washer’, which is a rather odd choice of words for the given the context. It has most likely been selected straight from a dictionary, as *laundering* may also refer to the act of washing something. It is interesting to consider, however, if the image has supported this somewhat unsuitable translation solution. The liquid (finely ground ore mixed with water) moving inside the magnetic separator has been depicted in the image as light blue while, in reality, it is a dirty shade of brown. It would be interesting to know whether the translator would have ended up with the particular solution even if the image had depicted the liquid in a colour that is not as easily associated with the state of being clean. To sum up, modifying the shape of the part in the image so that it no longer resembled a trough resulted in that none of the translators who actually compared the term with how it was depicted in the image while translating employed a translation solution literally describing a trough.

Example 5: The non-magnetic particles flow in the opposite direction to the drum rotation and are discharged through an overflow into **a tailings chute**.

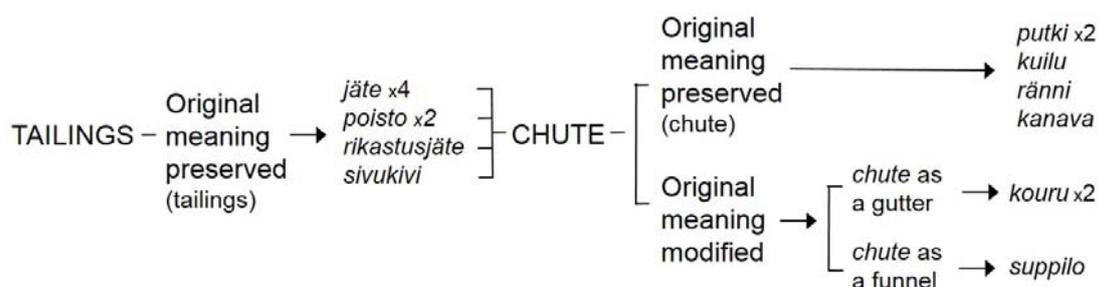


Fig. 6: Choice network of the translations of the term *tailings chute*.

Figure 6 represents the choice network of the translations of the term *tailings chute*. As mentioned in the discussion of example 3, analyzing a preceding part of the same phrase, the *tailings chute* is not depicted in the corresponding image at all. Earlier in the article it was suggested that the translators might not have understood the particular phrase correctly due to the lack of visual information.

The choice networks for the terms *tailings launder* in figure 5 and *tailings chute* in figure 6 offer an interesting comparison of how the visual source text may affect terminological choices during translation. The two parts of the equipment are identical in function and usually highly similar in appearance: they are both vertical troughs which convey liquid containing the tailings (non-magnetic ore particles). In fact, employing the exact same term to describe them both would be recommendable for the sake of terminological consistency. However, different terms were employed in this source text in order to elucidate whether the differences in the corresponding visual information would cause them to be translated differently.

As may be seen in figures 5 and 6, the options of *putki* and *kouru* were the only two that were employed for both terms. Unlike in the previous example, nobody translated *chute* as ‘container’, which further affirms the idea that it was, in fact, the visual source text that prompted this option. Compared to the translation solutions presented in the previous example, the translators provided four novel solutions: *kuilu*, *ränni*, *kanava*, and *suppilo*. The first three of these can be considered to more or less preserve the meaning of the original, even though *kuilu* can also refer to a ‘shaft’ and *kanava* to a ‘channel’. *Suppilo* ‘funnel’, employed by one translator, refers to a tube or pipe that is wide at the top and narrow at the bottom. Perhaps not surprisingly, this option was not employed in the previous example where it would have contradicted the visual source text. In other words, *chute* offered the translators options that *launder* did not. One could suggest that not limiting the meaning of the verbal text with visual information opened it up for new interpretations. Conversely, this would mean that visual information can restrict the translators’ interpretation of verbal information, or specify the meaning of verbal items in translation.

4.2 Discussion of the Results

The article will now consider what the choice networks of the data may disclose about the cognitive processing underlying the translation of this particular multimodal text, and how the analysis of the translation diaries (Ketola 2015) may further elucidate these observations. The networks introduced above represent the range of options that a particular segment of the multimodal source text offered for the group of translators. What these choice networks have in common is that some of the options displayed in each seem to be affected by the information conveyed by the visual source text – the combination of the visual and verbal information offered options that the verbal source text on its own did not.

The comparison of the translation solutions for the word *magnet* (figure 3) reveals that the multimodal source text seemed to offer only one obvious option which was employed by all of the translators who actually included the particular word in their translations. Curiously enough, the choice between singular and plural noun form corresponded to the information provided by the visual source text. It would therefore seem that the visual source text affected the way in which this item was translated. One could hence suggest that the cognitive processing of the item involved interpreting both

verbal and visual information. This part of the source text was not discussed in the translation diaries, perhaps because the changes made were so minor that the translators did not feel the need to justify them, or perhaps because the translators were not consciously aware of these changes.

The choice network of the prepositional phrase *in the upper part of the equipment*, figure 4, showed that some translators disregarded the information conveyed by the verbal source text altogether, which is perhaps the most obvious example of the visual source text guiding the translation solution found in the data of the study. What can be inferred about the cognitive processing behind this item? Based on the choice network alone, one may conclude that at least the two translators who decided to reproduce the information provided by the image processed both verbal and visual information – to the degree that they noticed the contradiction of information. In addition, based on the analysis of the translation diaries, one may conclude that the same was true for five others as well, even though they decided to preserve the information as expressed by the verbal source text. All in all, it could be suggested that the cognitive processing of the particular item generally included a careful, intentional negotiation between the information provided by the two modes. However, this is not to say that the fact that the visual mode provides information that is contradictory to that provided by the verbal will always result in the translator having to choose between one or the other: as illustrated by the example of the verb *submerge*, the translator does not always inspect both modes thoroughly enough to acknowledge a contradiction of information.

Based on the choice network alone, it is quite challenging to interpret the translations of the prepositional phrase *through an overflow* (figure 2). Yet, the analysis of the translation diaries considerably elucidates the translators' thought processes. Most of them explicitly reported not having understood this particular phrase. The study (Ketola 2015: 27) suggested that instances such as these reflect an effort to interpret the multimodal source text as a whole: the translator maps visual and verbal information onto each other, or confirms the verbally acquired information from the image. If this cannot be done (as in the present example), the translator is left with an impression of not having understood the verbal text at all. This information is valuable for the interpretation of the choice network. Only two of the options displayed by the choice network preserve the original meaning of the item (*overflow* as a part of the equipment). The rest of the options – which either conveyed a somewhat mistaken idea of the item or omitted it – reflect the fact that the translator had trouble understanding the meaning of the item. One can suggest that the cognitive processing of the item included negotiating the combination of verbal and visual information and that the lack of visual information complicated this processing considerably.

Another example of how visual information – or the lack of it – may affect translation may be seen in figures 5 and 6 representing the translations of the terms *launder* and *chute*. As stated above, the terms represent two functionally corresponding parts of the equipment, designated in the verbal source text by two near-synonyms. What sets them apart is how they are depicted in the visual source text. The translation solutions

produced for *launder* seemed to conform to the way in which the part was depicted visually more than to the way in which it was described verbally. In turn, the somewhat inaccurate translation solutions produced for *chute* reflected that the translators had trouble understanding what the term refers to exactly. Again, one could claim that the cognitive processing of the multimodal source text has included thoroughly inspecting both modes: when visual information was available, it affected the way in which the verbal text was interpreted. When visual information was not available, the inability to interpret the modes in relation to each other complicated the translators' efforts at arriving at a translation solution.

All in all, the analysis of the data implies that the image may refocus the interpretation of the verbal text. Interpreting verbal information in relation to images may result in a verbal source text item being attributed meanings it would otherwise not have, or even disregarding verbal information altogether and replacing it with information conveyed by the visual. The translator may attempt to interpret words in relation to images to the extent that the lack of visual information and, consequently, the inability to interpret the modes in relation to each other, disturbs the translators' source text comprehension. However, as the chosen method of analysis readily displays, the same combination of verbal and visual information may be interpreted in various ways. The fact that an image has the potential to specify the meaning of a verbal source text item does not automatically mean that this specification of meaning always takes place. In the same fashion, the fact that the verbal and the visual source texts provide contradictory information does not necessarily mean that the translator purposely chooses between one and the other.

4.3 Evaluation of the Method

As illustrated by the above discussion, CNA can be a valuable component when examining the range of translation solutions that a source text may offer for a group of translators. However, it is reasonable to ask how much we may really infer of a translator's cognitive processing simply by examining the results of this processing. As posited earlier in the article, CNA is not able to access the reasons behind the translation solutions – which, admittedly, is an inherent limitation of all product-based studies investigating the cognitive processing during translation. This limitation also repeatedly became evident in the present analysis: for instance, in the analysis of the part of the source text in which the two modes provided contradictory information, CNA only revealed that the majority of the translators conveyed the information expressed by the verbal text. Without the analysis of the translation diaries we would not know that the majority of the group actually identified the verbal element as mistaken, but nonetheless insisted on conveying this information to their translations. Without the analysis of the translation diaries, in other words, we would not know that both of the modes were attentively scrutinized and that the choice between either conveying the information provided by the verbal or the visual mode was negotiated with conscious attention. One

may therefore conclude that it is highly recommendable to triangulate CNA with a complementary method of acquiring into how the translation process unfolds.

Despite its limitations, the method yields a useful tool for the empirical investigation of translation. Laying out the range of translation solutions that were produced for the same source text segment is an excellent way of illustrating in how many different ways the same segment may be interpreted and translated. Further, it encourages the close comparison of the translation solutions and hence invites the analyst to contemplate on the reasons behind the differences in the solutions. In practice, the detailed construction of the networks is somewhat time-consuming and the author would therefore suggest that the method is best suited for relatively small samples of data, such as the data of the present study. Campbell's own applications of the method, too, usually employ a sample size of nine participants (Campbell 2000a: 34, 2000b: 218; Campbell/Hale 2002: 23). Limiting the number of participants is obviously another limitation of CNA, since the observations made during the analysis can, by no means, be claimed to be exhaustive. A larger sample of participants would most likely reveal yet more ways of interpreting the source text.

5 Conclusions

The article set out to assess if the images of an illustrated technical text can affect the way in which the verbal text is translated. Based on the analysis of the data, we may postulate that the image is capable of reattributing the meaning of a verbal element. For instance, visual information can specify verbal information: some of the translation solutions in the data could reasonably be claimed to be influenced by the way the corresponding information was represented in the visual source text. In the most extreme cases, conflicting visual information may cause verbal information to be disregarded altogether. All in all, the meaning of the multimodal source text item often seems to be negotiated from the combination of both modes. If visual information is not available, the attempt to negotiate meaning from the multimodal ensemble may even disturb the translators' source text comprehension.

Yet, making claims about how the interpretation of verbal information is affected by the visual means that we are looking at the subject from a verbally informed perspective; the interpretation of the image is obviously also affected by verbal information. From a more holistic point of view, we may postulate that interpreting the combination word and image may result in a novel interpretation of the whole: verbal and visual information may redetermine each other and hence, together, they may codetermine the meaning of the whole.

It must be emphasized that the combination of verbal and visual information can be interpreted in various different ways: the meanings the two modes produce together are neither predetermined nor clear-cut. The combination of word and image cannot be equated with a set meaning they automatically produce when presented together.

Moreover, multimodal integration of meaning does not always take place even if various modes are simultaneously presented for the reader (translator): the reader does not necessarily acknowledge both modes with equal attention at all times.

The discussion presented in the article hopes to emphasize the importance of examining the translations of illustrated texts in relation to both of the modes constituting the source text. On a more general level, the discussion hopes to further encourage translation studies towards examining how modes other than the verbal are involved in the translation process. As Campbell remarks, the observations made by CNA can subsequently be used as hypothesis in the examination of other texts (2000a: 32). Recommended directions for future research could include comparing choice networks to data collected using methods such as eye-tracking and keystroke logging. Eye-tracking methodologies could be used to record where the visual attention of the translator lies in each moment and hence determine how often the visual source text is actually inspected; coupled with keystroke logging this information could establish when exactly these inspections took place during the translation process.

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