The complexity of situated text design: a negotiation between standardization and spoken language in a manufacturing company

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In information design textbooks, text design is mostly understood as typography and layout. The meaning-making process of language, involving social interaction that affects language, is rarely acknowledged. Instead, texts are supposed to be "clearly" written. In this research article, we argue that the understanding of text design could benefit from also addressing text production and use situated amid social activity. This article presents a study on a text design process partly based on spoken language and owned by assembly operators in a workplace. Capturing the spoken dialogue and transforming it into instructive texts resembling transcripts are essential steps in securing the best practices for the smallest tasks in manual assembly, the minima of working, which is crucial for manufacturing. Our aim within the information design field is 2-fold: To underline the meaning-making process in language as a social phenomenon and to show that the situated design perspective, i.e., an outlook that highlights the uniqueness of the setting, can be important for the production and use of certain texts, such as instructions, and for affecting language. We asked ourselves: What are the consequences for the information design field when meaning-making in a language is understood as being socially situated in an activity? We have studied a design process and used observations, interviews, and text analysis to gather data. The result showed that the workers' ownership of text documents is crucial for the texts' use, yet the texts used do not meet the standard of information design textbooks. Moreover, the design of the text involves a continuous and non-linear collective negotiation that balances standardization in language and work procedures with the incorporation of operators' linguistic improvements. We unfold a case of text design where there is a closeness of designer and user roles, a non-linearity of the process, and an understanding of an information design product as becoming rather than having been finalized for use.

KEYWORDS

text design, spoken language, transcription, ownership, manual assembly instructions

1. Introduction

Information design is a field of practice that produces information to be as effective as possible for understanding communication or promoting an action, e.g., in instructions. Graphic design and visuals have historically been in focus. In information design textbooks, text design has mostly been understood as typography and layout, although semiotics can be briefly mentioned (e.g., Jacobson, 2000; Pettersson, 2002; Coates and Ellison, 2014). When commenting on language, the focus has frequently been on formal and vague tropes such as writing "clearly," using a "consistent writing style," and producing "concrete" texts

(see, for example, Pettersson, 2002) without "embellishments" (Frascara, 2015). This is all very well when it comes to communicating with larger groups, and there is a necessary distance between the designer and the user of information; the user is still the "other" to be considered by the designer (Frascara, 2015, p. 5). However, there are areas where information is both being produced and used closer to the actions informed about, but this comes with consequences for the idea of, e.g., text design: the closeness of designer and user roles, the non-linearity of the process, and the understanding of an information design product as becoming rather than having been finalized for use. We highlight this through an illustrative case where social interaction in producing and using informative texts and other activities is crucial for meaning-making in communication.

Our aim in the field of information design is to underline the meaning-making process in language as social and sometimes as situated in a particular setting. Therefore, texts have traces of the uniqueness of the context and social interactions in their form. Texts even have features like those in transcriptions of talk, i.e., texts have captured the talk in the workplace, where they are both produced and used. The case highlights the consequences for text design in an organization that aims to standardize communication while also recognizing the need to capture the minima of tasks discussed and performed by operators in their activity. We asked ourselves: What are the consequences for the information design field when meaning-making in a language is understood as being socially situated in an activity? The significance for the information design field is to broaden the understanding of text design, mostly understood as typography, and recognize the lived interplay with form and content in a situated and social setting for meaningful communication.

By neglecting to incorporate insights from other disciplines, such as linguistics acknowledging the social nature of language, the discipline of information design runs the risk of developing inadequate theories that do not effectively address the complexities of real-world information design practices. The practical contribution lies in fostering a more favorable understanding of collaborative writing and using texts based on spoken interaction in information design.

It should be noted that social semioticians, sometimes referred to in information design, work with how multimodal communication functions during activity in education (e.g., Bezemer and Kress, 2016). Kress and van Leeuwen (2006) also started from a social and linguistic base, e.g., by promoting visuals in socio-semiotic communication. We are not claiming that our study is the first to assume the social perspective in communication and design; rather, we argue that it is still relevant to underline that the meaning-making in a *language* is social, as demonstrated by the case in our study, to enhance the understanding of informative *text* design. Moreover, it is worth noting that the consequences of factors such as the division between the designer and user roles, the categorization of texts as "instruction" or "personal letters", and the outlook on the processes involved in text design have

ongoing significance and merit further discussion. The field of information design often falls short of accommodating a spectrum that encompasses both the design of generic information for broader audiences and the design of situated information that acknowledges the uniqueness of the context. Our position aligns with the latter outlook but with a focus only on language in text design. In addition, it should also be mentioned that technical communication is indeed a field where scholars have challenged the ideal of writing "clearly". We shall return to this subject later in the article. In this introduction, we now turn to the perspective of text design and situated design used, followed by a summary of the positions taken on language from linguistics, supporting our perspective.

The text design used in this article is defined in line with Schön's (1983) concept of the reflective design practitioner. Schön (1983) emphasizes the concept of continuous and reflective conversation with the design material, which is closely linked to practice and is relevant for situational design (e.g., Simonsen and Hertzum, 2012). The situated design perspective, as described by Simonsen and Hertzum (2012) and Simonsen et al. (2014), underscores the uniqueness of a situation into the design and has its roots in the understanding of knowledge as situated. A situated perspective can underline both the fact that different people come together in the design and also the collaborative, ongoing work improvements of a design (see Olsen and Heaton, 2012) as relevant for the organization's aim of capturing the minima in work tasks in our case. The term "minima" used in this article refers to the smallest entities in the lived practice of a situation, in contrasts to standards, for instance, in concepts. The smallest work entities make their mark in language. In our case, the philosophy of the company embraces a bottom-up perspective in the name of efficiency and quality work.

As we shall observe, the capture of operators' best practices regarding the smallest work task is accomplished through a specific type of text utilized on the production line, affecting the language employed within the text. Moreover, the user can be problematized from a situated design perspective: "The concept of the user relates to the appearance of many different actors on the stage of design" (McHardy et al., 2012, p. 99). Here, the users can be "makeshift users" involved in the design project (p. 96), i.e., participants in design. Concerning our design research perspective, we have taken the research-into-design approach, i.e., we studied a design process, rather than the research-through-design perspective, i.e., gaining knowledge through participation in the design process, which is more usual in situated design research (Baerenholdt et al., 2012).

Regarding the process of writing texts amid an ongoing activity, we will refer to Schön's (1983) insights concerning reflection on and in action during the design process, as well as his thoughts on capturing the knowledge acquired through reflection in the form of *description*. Schön (1983) links intuitive reflection in action with the difficulty of formulating what one knows; tacit knowledge does not easily transform into language. However, knowledge in action must be transformed into language for communication with others if a consensus is desired. The descriptions linked to action can be viewed as part of the frame of a practice affecting practitioners' reflection in action. Schön (1983) writes that the media cannot be separated from the language here; they make up the "'stuff' of inquiry in terms of how the practitioners move, experiment, and

explore" (p. 271). There is a "feel" for the activity of touch as well as a "feel" for the language (p. 271). The media and language, for example, the language on paper in the binder on a workshop floor, as we shall notice in our case, are also subject to change. Schön (1983) wrote that the reflection accomplished in action is not dependent on a description of the intuitive knowledge but that some descriptions can be appropriate: "Descriptions that are not very good may be good enough to enable an inquirer to criticize and restructure his intuitive understandings so as to produce new actions that improve the situation or trigger a reframing of the problem" (p. 277). As we shall observe, reflection on action is necessary, together with other roles representing the frame for creating the instructive texts with the character of transcripts in our case. The issue with transcripts, however, is mostly that, when they become decontextualized, understanding suffers, e.g., in transcripts from covert recordings later used in court (Gilbert and Heydon, 2021). We will come back to this in the findings and Discussion section.

Collaborative design, often associated with the situated design perspective, is frequently referred to as co-design. It involves many stakeholders engaging in various modes of design. For instance, Roth et al. (2017) examined dialogues encompassing both words and gestural interactions among collaborators and their engagement with materials throughout the co-designing processes. Because of the situatedness, this can mean that designers and users interact during production. Lee (2008, p. 33, with reference to Lefebvre, 1972) is of interest for the present article because of the proposal of a "realm of collaboration" instead of, on the one hand, an abstract space where designers and experts work, and, on the other hand, a concrete space where people, i.e., users, live. Lefebvre (2003, p. 182) wrote about a concrete space of "habiting, gestures and paths, bodies and memory, symbols and meanings … contradictions and conflicts between desires and needs", in contrast with an abstract space where designers "look down on their 'objects' … from above and afar". The image of a collaborative space can be contrasted with the linear process produced by the notion of a distance between the designer and the user. From the field of co-creation in designing, we can understand that collaborative writing in the situated text design has a close link with Schön's (1983) frame of media and language in that it is intertextual and verbal; it is in its meaning-making and consists of negotiations, talks about work, in a concrete space, or as Lee (2008) calls it, in a realm of collaboration.

Having addressed our design focus, we turned to how language is related to the social setting in which it obtains its meaning. Thinking in terms of linguistics is important here. The arbitrary character of linguistic signs, highlighted in linguistics by De Saussure's (2015) semiotics, underlines that there is no necessary correlation between a sign and an object and underscores the difference between the system and the usage of linguistic signs. The consequences of the arbitrary character of linguistic signs piqued philosophers' interest throughout the 20th century. Rorty (1992) described this as a linguistic turn. The social perspective on language has mostly been taken over by linguistics (Nystrand, 1989). This is, for instance, observed in writing research (Hyland, 2016) and in the field of workplace writing (Bremner, 2018).

Concepts of importance in workplace writing are the understanding of "intertextuality" in the sense that writing always relates to other texts and "collaboration" in the writing process. Particular writing is "taking shape within chains of emails or other interactions, incorporating the work of colleagues as part of the collaborative process, or being informed by templates, practices, and traditions that are specific to an organizational setting" (Bremner, 2018, p. 7). The frame of media and language in an organization (Schön, 1983) can then be observed as the intertexts to which certain writing, e.g., an instructive text, is related. Bremner (2018) wrote about the templates produced for a particular need as generic intertextuality. Moreover, intertextuality is linked to the collaboration of colleagues in a workplace: "[I]nput and influences will come from the work of colleagues—workplace writing is essentially intertextual in that writers are collaborating, building on and revising each other's work in the process of knowledge making" (p. 43, with reference to Reither, 1993; Prior, 2004). The authority of authorship concerning workplace texts in companies shifted when companies started to notice the value of corporate identities. Authorship then slipped away from individuals to organizations. In technical communication in organizations, this has long been the case (Debs, 1991). Collaborative writing, Bremner (2018) writes, "is an almost integral element of any organization" (p. 55).

Instructive texts are commonplace in the case we have studied in the manufacturing industry. Delin (2000) wrote about instructions as an everyday type of text, where texts exist in relation to products and actions in contexts. The relationship with activities carried out in the context of the instruction emphasizes that the exactness of language depends on the writer and the receiver sharing or knowing the context in which the text is to be understood. This close relationship between using a product and the instructions, in association with the relevance of time issues, tends to make the language "telegraphic" (p. 68). Delin (2000) also wrote about how authority affects the choice of the directive. If no authority exists in the relationship between the speaker and the hearer of an instruction, it affects the form. This is also the case with texts in the field of technical communication, as mentioned earlier, bordering on information design, linguistics, and engineering. Kirkman (2005) addressed this in *Good Style: Writing for Science and Technology* as early as the 1990s (see also Pettersson, 2002). More recently, in this domain, Schneider (2002) has problematized "clarity" in language and claimed that the closeness of the technical communicator and the user through interaction in the same context is a key element. A workplace context is also not static but "constituted, moment to moment" (p. 212). Schneider (2002, with reference to Hayman, 1994) suggests "strategic talks" to create clarity in communication. Plain language is not always the answer to clear communication; jargon can communicate more effectively among people in a specific context. Blakeslee and Savage (2013) also wrote that, as a designer of technical communication, one should ask oneself what it means to write well in the industry, the field, and the company. The context is thus decisive.

In applied linguistics concerned with professional practices, texts used in an activity are sometimes called "inscribed objects" (Prior, 2020). In an ethnomethodological study, Due (2020), e.g., wrote about how information sheets in optician settings, sometimes called "charts," "leaflets," or "guides," are understood as inscribed objects consisting of many different signs and used cooperatively in social interaction, *in situ* in a work process as

a resource for decision-making. The sheets are used in relation to pointing gestures and stares in communication about buying and selling glasses or contact lenses in an optician shop. Due's (2020) case shows that the informative sheets are used to establish shared "attention and common ground through verbal, spatial, and embodied orderly actions. Pointing practices, embodied orientation in space, gaze, and the use of the sheet are deeply embedded in ways that exploit the specificities of the situated action" (p. 140). The instructive sheets then have a central position for the activity taking place. Sticky notes can also be considered such inscribed objects.

Sticky notes are understood as both material objects, easily attached to various surfaces, and as inscribed objects that bear information (Landgrebe and Rye Marstrand, 2020, with reference to Caglio et al., 2014; Weilenmann and Lymer, 2014). An interesting parallel can be drawn between our study and the investigation conducted by Landgrebe and Rye Marstrand (2020), as both studies examined organizations that have adopted "lean management" principles. This philosophy involves engaging the workforce in continuous improvement, which is also the context of our case. This is interesting because informative sticky notes also play a role in our setting of continuous improvements.

We are drawing on the theories and previous research mentioned above to support an understanding of what text design could be. Informative text design can be found in settings with high social interaction with and about work activities. In this sense, text design takes place in smaller groups, where there is a close relationship between both doings and descriptions of doings. The team effort is rather a realm of collaboration than a linear process of writing and using. Instead of concrete genres, like "instructions," as we shall notice in our case, there are inscribed objects of information and ongoing writing of texts. The case article will give relevance, through the thinking above, to a type of text production and use that is rarely studied in the sense of informative text design. In the next section, we will turn to the choice of setting, the materials, and the methods used.

2. Setting, materials, and methods

2.1. Setting

The production line studied in this case is in a factory that belongs to a multinational company. The company has a lean philosophy inspired by Japanese manufacturing thinking (Liker, 2004). In the corporation's way of working, each individual and team is important for the quality of the production. Quality is achieved through internal efficiency, which means that there is a standardization of routines and tools throughout the company. It is an ongoing work that also acknowledges the bottom-up perspective, involving operators on the workshop floor to eliminate all sorts of waste, i.e., matters that do not contribute to efficiency and quality. Lean production and standardization work have been implemented in the factory since 2011, and the operators work in groups, at workstations, and on the production line[1,2]. In

standardization work, the operators also participate in writing the existing standard of an operation in manual assembly, that is, the method used so that another operator can read it[3], e.g., new personnel or workers from another part of the line. According to Liker (2004) and Liker and Meier (2006), standardization work is not the fixing of a final method but a starting point from which one continuously improves. The reason for choosing the company for our study is that they have undergone a transformation into lean production, meaning that they do acknowledge a bottom-up perspective concerning improvements. At the same time, there is continuous calibration concerning processes taking place. This would, we believe, affect the language used in instructive texts for manual assembly.

2.2. Materials and methods

We conducted a small case study (Merriam and Tisdell, 2016), collecting data through interviews and on-site observations on the workshop floor, with one interview in a small meeting room with the production technician (PT)[4], and conducting text analysis. The nature of the data is ethnographical and in line with the study of a research-into-design process. Observations took place at one assembly line in the manufacturing company in Sweden, in interaction with operators (O1, O2),[5,6] the team leader (TL)[7], and the assistant team leader (ATL), explaining the site, the situations in which the texts were used, and their functions (see text footnote 2). Using a semi-structured guide, we conducted in-depth interviews on-site. Both authors participated in collecting the empirical data. The interviews were recorded, transcribed, and used for the text analysis. The text analysis, done by the lead author, was conducted to look for how language appeared in instructive texts and to recognize the social interaction in the setting where the text was both produced and used. The form of the language was linked to the setting, the situations and functions, and the participants in the communication. Only partly is this analysis in line with the social understanding of language in Halliday (1978, p. 11); the analysis is *not* a proper systemic, functional linguistic analysis. The functions we acknowledged are indeed the institutional setting (field) of the text and the relationship between the contributors of meaning (tenor), as well as the media through which communication takes place (mode) (Halliday, 1978, with reference to Doughty et al., 1971, 185–6). However, the analysis does not aim at establishing what selections of meaning the grammar implies to readers and writers but only *that* language in the texts studied takes its form, similar to transcripts of talk, yet functions in its social setting were compared with the information design ideal and rules mentioned earlier.

An initial examination, locating different types of documents, was first performed, and three types of texts were found linked to the manual assembly on the production line. Eleven documents, called Element sheets (confidential and cannot be disclosed), a form

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1   ATL, assistant team leader, was interviewed on 25 November 2013.

2   Observation (2013). Observation at location done on 25 November 2013.

3   XPS, The Company's Production System (2013).

4   PT, production technician, was interviewed on 25 November 2013.

5   O1, operator 1, was interviewed on 25 November 2013.

6   O2, operator 2, was interviewed on 25 November 2013.

7   TL, team leader, was interviewed on 25 November 2013.

of the information sheet, were thereafter singled out to be analyzed further concerning the language used. The initial examination of the documents showed that, in practice, the Element sheets functioned as instructions for how to perform the manual assembly. The sheets had a central position at the intersection between standardized work procedures, humans' social interactions, and capturing oral language in documents sharing features with transcripts. In this analysis, no visuals were considered because of the focus on language in text design.

3. Results

The findings will be presented below according to how, when, and why the documents were used. Thereafter, the process of document creation is elucidated and explored. Finally, the language of the Element sheets is discussed in relation to their ability to facilitate effective use within the setting.

3.1. Empirical findings

3.1.1. The documents' usage: how, when, and why?

Three types of documents linked to the manual assembly were found in a binder located at the balancing board of each assembly station on the production line (see text footnote 2): (1) The *Work instructions* were the oldest type of document, also used before standardization, consisting of an abstract drawing of components with arrows and different product parts' article numbers, showing the design of the product (see text footnotes 3, 4). We initially assumed that we should study these documents when looking for instructive texts; (2) *Standard operation sheets* (SOSs) [Swe. *Standard Operations Blad* (SOB)] and the Element sheets were introduced in the standardization in 2011. The SOS included the order of operations, times, a layout of the operator's movements, and variants of products in assembly. It had short sentences on "what" to do, pictograms on safety, critical moments, quality, and ergonomics, and it was hung at the workstation (see text footnotes 2, 3); and (3) *Element sheets* contained the best-known agreed-upon practice, the standard of "what," "how," and "why" in manual assembly. These sheets followed the same template form in the whole factory, as did the SOS, and showed one activity linked to a certain time (the tempo of the operation), the shortest standard time in the production cycle, and the minima. They contained the information required to perform work safely with the right quality at the right time (see text footnote 3). Photographs were used "to facilitate understanding" (see text footnote 3), and they sometimes had arrows marking movements and circles showing focus points. They also included pictograms, as in the SOS (see text footnote 3). If there were options, there was a sheet for each variant. Moreover, product parts' article numbers were not allowed in the *Element sheets* (see text footnote 1). It can be noted that all product parts used in the assembly were to be found at the assembly stations, ready for use and rewriting.

In the first examination, we turned to the use of the documents, which also led us to single out the *Element sheets* for further analysis of the language. It is important to note that the *ideal*

on the workshop floor would be to *not* use documents during assembly. This is significant because of the effect spoken interaction has on instructive texts. Together with the company's bottom-up perspective regarding efficiency and quality work, the operators' discussion regarding their work is crucial for determining the best practice in a continuous negotiation among the operators. The operators thus first ask other, more experienced co-workers if a question arises. The oral mode was the priority, and there was intricate knowledge about whom to ask about what on the workshop floor (see text footnotes 1,2, 4). When the text mode in the documents *was* used, this occurred in four situations: (1) if a need for information arose during assembly, (2) in daily work observations, (3) in education, and (4) in seeking/solving a problem in production.

If (1) *a need for information arose* during assembly, the operators first turned to a colleague, as mentioned above, and then to documents (see text footnotes 1, 6). However, the assistant team leader noted the importance of checking the standards in the Element sheets (see text footnote 1). The main function of the Element sheet here was to provide correct instructions on how to perform a work operation. The SOS was the text quickly looked at for time, order of events, and considerations needing special attention, such as safety and quality (see text footnotes 2, 5). The Work instruction was not used at all if a need for information arose. In daily (2) *work observations*, the Element sheets were used to see if the standard was preserved or needed improvement (see text footnote 3). The main function of the sheet in work observations was to be a description of the best-known standard at the time. The SOS was updated if affected by an update of the sheet. The Work instruction document was not used in these daily work observations. In (3) *education*, the three documents were used when an operator was new or if there was a new model on the production line. The operator read the binder with all documents and worked under supervision for up to 2 weeks (see text footnote 1). The main function of the Work instruction in education was to teach about the design of the product to be assembled, which was relevant for memorizing actions linked with product parts used in assembly. The main function of the SOS during training was to teach the sequence, time of operations, and movements of the operator (see text footnote 3). Another function of the SOS was to teach when safety, quality, critical moments, and ergonomics were highlighted. The main function of the Element sheet here was to explain the standard and the best practice for the smallest operation in assembly. Especially relevant for learning was the reason given for a method, the "why" in the Element sheet (see text footnote 6). The texts were also used to (4) *seek/solve a problem* in production at large. If the standard was followed, there should not be a problem with a particular operation (see text footnote 1).

To summarize, the Element sheets were used if questions were raised during assembly, in work observations, in training, or if problem-seeking/solving was needed in the factory. Only the Element sheet had three functions: *documentation, instruction,* and *educational* material in training. It was the knowledge of the operators that enabled the establishment of a standard and the maintenance of these functions. According to all informants, all functions of the Element sheets sustained three functions (see text footnotes 1, 4–7). In the following section, we shall observe that the education function of the Element sheet had the potential to

suffer the most because of its transcription-of-talk character, which is because, in learning, there is an assumed decontextualization between the texts and the new operator, hence the need for learning. The most problematic document and most distant from the actual assembly was, surprisingly, the document called *Work Instructions*. During training, the operators had to memorize the product parts' article numbers—the main information—but the Work instruction was thereafter not used and was not continuously updated (see text footnotes 2, 4).

3.1.2. The text design processes

Concerning the initial production of the documents, a "preparer" and production technicians created the Work instructions before a new model was introduced in production (see text footnotes 1, 4). Production technicians, assistant team leaders, and team leaders wrote the SOS (see text footnote 4). Operators could participate in this initial phase through the technician when they had suggestions. This could be discussed in their teams or at daily meetings. Because of the bottom-up perspective of the company, there were many opportunities to participate in the construction of the SOS. In an earlier chapter of standardization, the operators updated the SOSs themselves without involvement from the production technician, assistant team leaders, or team leaders, which created problems with the accuracy of time-related information, prompting the discontinuation of this practice (see text footnotes 4, 6). An important point to note in this study was that the Element sheets, from the beginning of the standardization work, were written by the production technicians. However, the operators (see text footnote 4) did not use the top-down text design. The production technician and the assistant team leader then insisted on the importance of involving operators in the writing process; it was regarded as quality work (see text footnotes 1, 4). Element sheets, functioning as the work instructions, were then really "owned by production", that is, assistant team leaders and team leaders created them when a new model was introduced or the pace was changed *together* with the operators. Initially, this was a heavy job, but they were used (see text footnote 1).

In the process of capturing the best practice, the ongoing and daily rewriting of the Element sheets took place during daily work observations and when solving problems in production. The team leaders or assistant team leaders took the binder and followed a chosen standard daily while observing an operation. Small discrepancies between text and activity were frequently found (see text footnotes 1, 5). The issue was then discussed and negotiated; it was then determined whether a rewrite had been missed or if the operator needed to be informed of the revision to the standard (see text footnotes 1, 5). The negotiation took place among operators in different work shifts and with team leaders and assistant team leaders, sometimes also with the production technician, regarding both the manner of assembly and the formulation of the instructions. Operators, with their language, then participated in the rewriting of the sheets (see text footnote 1). The writing resulted in multiple authorship. In our case, 11 sheets had seven authors (or combinations of authors). This collaboration also, as we shall notice, affected the use of language.

All informants also underlined that updating required much ongoing work (see text footnotes 1, 4–6). The binder also contained several sticky notes for suggested updates, discussed or not yet discussed, still not written into the standard. Language was frequently discussed during the workday, which all the notes on the binder about changes in progress in the texts revealed (see text footnote 2). As will be discussed, there were also suggestions or questions concerning writing and working in the sheets. The language was intimately entangled with the operators' unfolding knowing and doing at the manual assembly workstation of the production line. The sheets had a central position, as in Due's (2020) study of information sheets in opticians' shops. In the following sections, we shall observe how the way of writing was related to talking during the activity, which was not the case with Due (2020) inscribed objects.

3.1.3. The Element sheets: language and the affordance of use in the setting

Regarding the way of writing in the Element sheets, in which operators participated in the rewriting, we examined the relationship between the manufacturing setting (field), the written language (mode), the functions, and the group to whom the text was addressed (tenor). The setting was manual assembly in a manufacturing industry; the functions were those of documentation, instruction, and educational material, and the readers/writers were the operators, team leaders, assistant team leaders, and new co-workers.

Related to the manufacturing setting, or frame, to use Schön's (1983) concept, the Element sheets had a lot of technical terms, such as "reversing alarm" and "check valve", concepts that were crucial for documentation and instructions and were familiar to the team or concepts to be learned in training. There was also a standardization of terms (see text footnote 4). We found recurring verbs related to the engineering field, such as "affix" and "install", examples of the company's regular terms. The function of documentation of the standard and the instruction on how to work might suffer in language, as will be discussed below, but training could be a function suffering in the distance between the time of writing and reading if certain terms in the texts were not made consistent. The template form and the layout were also the same throughout the factory, which made it easier to understand for a trainee or someone who had worked in another team during the learning phase. The main parts of the Element sheets were related to the uniform layout and consisted of columns for "what," "how," "why" illustrations, and time. There were also possibilities for writing down the history of safety and quality problems.

It should be noted that most texts in the sheets were about "how" something was to be done, supporting all the functions in the usage of the sheets. In the setting, since neither the Work instruction nor the SOS had texts on how to assemble, the Element sheets in practice were the instructions. Interestingly, our discussion below shows that the text named "Work instruction" did not function as such, and the text serving as an instruction was not named "instruction". One element of the sheets that pointed toward a cultural setting of talking or procedures that were not yet captured in language was that the fields and columns were left blank

in the sheets. The history of safety, for instance, was often left blank. Sometimes even the "how" to assemble was absent, leaving the "what" to do as the only instruction, documentation, and education. There was also a shortage of text on the "why", affecting the educational function since an incentive for the operation expands on the reasons for the work to be done. When the "why" element was present, this motive could be found in upcoming workstations or in the product's final use. Sometimes, the "how" to assemble was absent. In the column of what to do, it said, "Assemble the X clutch on Z," but "how" was not described (yet the whole operation, with five activities and only two with an explanation of "how", had three authors). It could also be assumed that the activities were self-explanatory and that there was no other way of working. This is also a sign of the contextualization of the texts, common in transcripts, capturing only the necessary information required for assembly at the specific site, reflecting the situational nature of the task.

The technical, standardized, and formal words were mixed with features in language coming from a culture of talking about work, giving them the character of transcriptions amid the activity. This was shown in the use of the Swedish word *skav* [Eng. "scrape"] instead of the proper *skavande*. We also found mash-ups of words; for example, "tighten" was written in Swedish as *dra fast,* but, here, it was inscribed as *drafast*. Moreover, related to both the setting and everyday local talk, there was an expression that was used both locally and technically. "Enter the nut" [Swe. *Äntra*] in Swedish is a specific word for "boarding", as in boarding a ship, but it is not used in "boarding" an airplane or a train. Here, the imperative was used for placing a nut on a screw before fastening it. It was the operators' term, and functioned precisely in the practical situation, sustaining documentation and instruction.

The texts had a vagueness in their appearance, yet they functioned well-enough as descriptions for others' intuitive understandings (Schön, 1983), although education, as we have observed before, might be a problematic function. The texts featured vagueness when referring to practical knowledge on-site in the situation, e.g., "make sure the X is in the right position". Furthermore, both the "what" and the "how" were imprecise in the text: What to do was to "[p]lace X on the assigned place", and the way of doing it was "[a]ssigned place in the pallets". It can be assumed that an operator would know the meaning of a "right" position and an "assigned" place. Imperative sentences were frequent: "Assemble the lower X" and "Dismantle the plug in the X." However, sometimes, a definite form and, other times, an indefinite form were used about the same operation: A/the "upper X tube," "partition wall," or "X console" was used. At the site, in assembly, this sporadic openness to any kind of, e.g., tube, would not have been a problem in this case since there was only one upper tube, partition wall, and X console to use in the task. In other cases, this was not easy because a diversity of objects and metaphors were used to handle the variety in the operations. "The stomach" [Swe. *mage*] of a tube was used for its convex bending in the analyzed sheets. This was a way of aiding documentation, instruction, and education among the group. The assistant team leader stressed that the operators, before standardization, used more metaphors than that. He argued that the groups' own metaphorical language could be good information: "If you have 40 differently marked tubes, you might need a way of remembering. This is not allowed in the

transcripts anymore... A 'yellow-pink' tube going up was called 'China,' and a 'blue-pink' tube going down was 'USA.'" This was, however, still used orally for memorization during training (see text footnote 1). We shall return to this topic later.

Another characteristic of the language was the different forms of spelling, presumably due to writing in haste and being influenced by talk and/or the multitude of authors. The Swedish word for "thorough" or "careful" was spelled both as *noggrann* (correct) and *nogran*. We also found a frequent loss of punctuation in single sentences and at the end of paragraphs, as well as grammatical errors. In the mix, there were also some signs of a formal character in the written language. The Swedish old-fashioned *ej* (Eng. "not") was used in writing instead of the everyday spoken word *inte*. The verb *kontrollera* [Eng. "control"] was used instead of the spoken and shorter *kolla* [Eng. "check"]. This could have been because of the sense of formality given to the act of writing down the practice. Additionally, the variations in spelling and other aspects could potentially be attributed to the multiple authors involved, each with their own backgrounds, experiences, and levels of comfort with writing. None of these formal ways of writing seemed to disturb the functions of the sheets. Collaborative writing is intricately related to the continuous discourse surrounding work within all teams. Whoever was working when the negotiation over the standard and the documentation in writing were updated contributed to the form the language took.

The team leader and assistant team leader played a crucial role in upholding the texts within the company's standardization efforts by maintaining continuous communication with the operators, which included activities such as work observations. The evolving nature of the sheets can be perceived not only through the incorporation of numerous sticky notes but also through tangible evidence found in specific notes within the texts themselves. In one place where the history of safety could have been written, there was a note in the form of the abbreviation "Upd." [Swe. *Uppd.* for *uppdatera*; Eng. "update"] to mark a wish to revise the sheet because of a problem in assembly. Another sign of the evolving nature of the texts was the presence of three question marks following a description of the operation, highlighting an element of uncertainty or the need for further clarification.

To sum up, despite the language on the Element sheets consisting of a combination of standardized language and operators' own vernacular, characterized by grammatical, spelling, and punctuation errors, metaphors, and local vocabulary, the Element sheets were still considered well-functioning in the context of their use. The results showed that the texts were not decontextualized in most functions, as transcripts can be in other fields (cf. Gilbert and Heydon, 2021), but one function of the documents was educational: they were used in the training of new co-workers, and this was where standardizations in language became crucial.

Paradoxically, while standardization aimed to enhance efficiency and engage workers across the entire factory, it did not always effectively fulfill its educational function. Conversely, oral metaphors used in conversations proved to be helpful. In the described situation involving numerous tubes, the capturing of operators' dialogue was prohibited, leading to a detriment in both instructional and educational functions. Furthermore,

the documents labeled "Work instruction," which included article numbers for parts, were disconnected from their practical application and production processes, resulting in not updated information.

4. Discussion

The aims of our study in the information design field were to highlight the meaning-making in language as being socially situated in its context. Entering the study, we asked ourselves the question, what are the consequences for information design's idea of text design when meaning-making in a language is understood as being socially situated in an activity? In our case, the continuous capture of the best practice, focusing on the smallest units in the operations, required both knowledge and language from the operators, but this affected the texts. This is where the topic of the transcript-like character becomes relevant; the formulations from the operators provided the texts with a spoken language character, dependent on the immediate context. In this discussion, we combined the theories with the findings to answer our research question concerning the Element sheets used and considered to function as per the documentation, instructions, and educational material. We highlighted the consequences for the design of informative text while also acknowledging the process of writing these sheets as text design.

First, sometimes a *mix of designer and user roles* is necessary, i.e., when certain informative text design needs the user's situated knowledge and "feel" for action, *along* with the user's formulating the action in the language (Schön, 1983), as these are relevant for the design to be used. It involves acknowledging and incorporating the operators' tacit and intuitive knowledge, their innate sense, and familiarity with the assembly process through their cognition, physical touch, and muscular strength, all intertwined with language (Schön, 1983). The operators are far from the passive position of being "given a set of instructions" (Delin, 2000, p. 59) by a distant designer. The operators rather take on a "makeshift-user role" (cf. McHardy et al., 2012) and cannot be categorized as the "other" to the designer within a theory of user-subordination.

Second, the language has intertexts from the workplace setting (Bremner, 2018), protected by team leaders and assistant team leaders. We observed that the sheets' learning function could suffer from the writings' closeness to talk. According to this understanding, text design needs continuous *protection of intertexts in the continuous change of spoken language*. Teamwork becomes important here. Intertextuality can ensure the possibility of also communicating with new co-workers or operators from another part of the factory. There is no proper decontextualization of the readers of the sheets, but there have been some efforts to strive for formalization so that others, later in time and/or new to the context in a learning situation, will be able to understand the transcripts. There is a first short distance, one might say, between, on the one hand, an operation and the talk about it negotiated into a text, and, on the other hand, a new reader in time. This small distance shows the struggle between spoken language about the uniqueness of an activity and a formalization of the language referring to it. The case, however, also shows that standardization sometimes sweeps away the most precise and efficient discussions

using metaphors. Moreover, on another assembly line, they may never use the word "enter" [Swe. *Ändra*"], as in "enter the nut". A new reader would still recognize the template and the fixed terms, and through supervision, the activity and talk would make the transcripts clearer. In addition, the team leader and the assistant team leader ensured that local terms that become a problem in communication were replaced.

Third, some text design practices could be understood as *collaborative writing based on negotiations*. Despite the influence of discussing assembly and reflection on action (Schön, 1983), which resulted in a telegraphic writing style (Delin, 2000), the presence of "strategic talks" (Schneider, 2002; see also Blakeslee and Savage, 2013) contributed to enhanced clarity in the communication for others. This clarity was achieved through the negotiation process among operators and team leaders. The clarity in the text emerges through a collaborative "struggle" of discussions (McHardy et al., 2012). This collaboration is part of the close struggle for continuous improvements and formulating new methods, even at the smallest level of tasks, known as the minima, among the operators who possess ownership of the *Element sheets*. To understand collaborative writing within this context, it is crucial to recognize the negotiation that takes place regarding both content and language in texts, highlighting the significance of this approach in text design.

Fourth, recognizing the *becoming character of texts*. The work with the Element sheets is an ongoing work, a becoming of design work (Schneider, 2002; Baerenholdt et al., 2012; Olsen and Heaton, 2012; Roth et al., 2017).

In addition to Roth et al. (2017) concept of becoming design, which emphasizes the interaction and correspondence between the designer and material in a specific setting, we want to emphasize the continuous and collective nature of the texts themselves as they evolve and develop through ongoing collaborative writing (Lee, 2008; Bremner, 2018). This practice thus challenges the idea of a finished design product at the end of a design process that can be evaluated or tested. In our case, the evaluation and testing of the texts within the design context itself occurred through daily work observations or when issues arose and discrepancies between the text and actual activities were identified. Rather than relying on separate evaluation stages, the assessment and refinement of the texts were integrated into the ongoing design process within the daily work environment.

The fundamental essence of design activity, which is open to change, is extended to a continuum. If the manufacturing company needs the manual assembly and capturing of best practices, the focus lies on the continuous evolution of the text itself rather than a fixed and final version. This aligns with the objective of the text becoming a dynamic entity. The evolving nature of the texts is also linked to the challenge of unclear genre categorization within their specific contexts of use (compared with principles of how to write, e.g., "instructions", and so on). The inscribed objects and ongoing writings are "intertwined forms of linguistic, prosodic, bodily" (Due, 2020) information.

Fifth, the design process is *not linear but a realm,* which we have already touched upon. The practice we have studied closes much of the distance between the designer's abstract space and

the user's concrete space (cf. Lee, 2008). Based on the case study, we deduced an image of a situated activity realm that features the ability to capture the minima in an ongoing collaborative text-design work with texts of somewhat unclear genres, having different authors, functions, and intertexts from the organizational frame, oral conversations, and the "feel" for the activity at hand. The text results cannot meet the information-design generic claim of what "good" design is. However, the results are complex text designs that satisfy many of their functions. By adding a living description of the operations in the Element sheets to be used by the team, it can easily be understood how the text can have meaning in practice while not always having a coherent style.

Finally, in the information design field, it would be interesting to draw on more cases with knowledge from both the applied linguistic fields and the design discipline at large. Moreover, it would be important to continue the discussion of the boundaries between informative text design and information design. Concerning our case, it should be noted that there was much work with the Element sheets. The continuous conversations and updates to the language in the sheets constituted a demanding job. We wrote earlier that acknowledgment of the minima in the functional texts appears to be a need in our case while following the company's standardization of work. However, because of the challenging workload and the developments in digitalization in Industry 4.0 (European Union, 2015), the instructional texts risk being produced in, to use Lefebvre's (2003) words, an abstract space before ending up on a digital screen at the assembly. For future research, it would be interesting to investigate how Industry 5.0, focusing on a human-centric industry (European Commission, 2023), considers the operators' best practices and their formulations in language about methods during digitalization processes.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study involving human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants in accordance with the national legislation and the institutional requirements.

Author contributions

A-LC has collected and analyzed the data, created the theoretical framework, and written the article. NS contributed by collecting the data. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Baerenholdt, J. O., Buscher, M., Damm Scheuer, J., and Simonsen, J. (2012). "Perspectives on design research," in *Design Research: Synergies from Interdisciplinary Perspectives* eds J. Simonsen, J. O. Baerenholdt, M. Büscher, and J. D. Scheuer (Abingdon, VA: Routledge).

Bezemer, J., and Kress, G. (2016). *Multimodality, Learning and Communication: A Social Semiotic Frame*. London; New York, NY: Routledge.

Blakeslee, A. M., and Savage, G. J. (2013). "What do technical communicators need to know about writing?" in *Solving Problems in Technical Communications*, eds J. J. Johndan-Eilola, and S. A. Selber (Chicago, IL: University of Chicago Press), 362–385.

Bremner, S. (2018). *Workplace Writing: Beyond the Text*. Abingdon, VA: Routledge.

Coates, K., and Ellison, A. (2014). *An Introduction to Information Design*. London: Laurence King.

De Saussure, F. (2015). *Cours de linguistique générale*. Lund: Arkiv förlag.

Debs, M. B. (1991). Recent research on collaborative writing in industry. *Tech. Commun.* 38, 476–484.

Delin, J. (2000). *The Language of Everyday Life: An Introduction*. London: Sage.

Due, B. L. (2020). Respecifying the information sheet: an interactional resource for decision-making in optician shops. *J. Appl. Linguist. Prof. Pract.* 14, 127–148. doi: 10.1558/jalpp.33663

European Commission (2023). *What is Industry 5.0?* Avaailable online at: https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/industry-50_en (accessed August 07, 2023).

European Union (2015). *Industry 4.0. Digitalization for Productivity and Growth. A Briefing September 2015.* Available online at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2015/568337/EPRS_BRI(2015)568337_EN.pdf~2023-05-19 (accessed May 19, 2023).

Frascara, J. (2015). "What is information design?," in *Information Design as Principled Action*, ed J. Frascara (Champaign, IL: Common Ground).

Gilbert, D., and Heydon, G. (2021). Translated transcripts from covert recordings used for evidence in court: issues of reliability. *Front. Commun.* 6, 779227. doi: 10.3389/fcomm.2021.779227

Halliday, M. A. K. (1978). *Language as Social Semiotic: The Social Interpretation of Language and Meaning.* London: Edward Arnold.

Hyland, K. (2016). *Teaching and Researching Writing, 3rd Edn. Applied Linguistics in Action Series.* New York, NY: Routledge.

Jacobson, R. (2000). *Information Design.* Cambridge, MA: MIT Press.

Kirkman, J. (2005). *Good Style: Writing for Science and Technology, 2nd Edn.* New York, NY: Routledge.

Kress, G., and van Leeuwen, T. (2006). *Reading Images: The Grammar of Visual Design. 2nd Edn.* London; New York, NY: Routledge.

Landgrebe, J., and Rye Marstrand, R. (2020). Sticking to the rules: post-its and members' competence in a Lean meeting activity. *J. Appl. Linguist. Prof. Pract.* 14, 172–199. doi: 10.1558/jalpp.33806

Lee, Y. (2008). Designer participation tactics: the challenges and new roles for designers in the co-designing process. *CoDesign* 3, 31–50. doi: 10.1080/15710880701875613

Lefebvre, H. (2003). *The Urban Revolution.* Minneapolis, MN: University of Minnesota Press.

Liker, J. K. (2004). *The Toyota Way.* New York, NY: McGraw-Hill.

Liker, J. K., and Meier, D. (2006). *The Toyota Way Fieldbook: A Practical Guide for Implementing Toyota's 4Ps.* New York, NY: McGraw-Hill.

McHardy, J., Wolf Olsen, J., Southern, J., and Shove, E. (2012). "Makeshift users," in *Design Research: Synergies from Interdisciplinary Perspectives.* Abingdon, VA: Routledge 95–108.

Merriam, S. B. and Tisdell, E. J. (2016). *Qualitative Research. A Guide to Design and Implementation, 4th Edn.* San Francisco, CA: Jossey-Bass.

Nystrand, M. (1989). A social-interactive model of writing. *Written Commun.* 6, 66–85. doi: 10.1177/0741088389006001005

Olsen, P. B., and Heaton, L. (2012). "Knowing through design," in Design Research: Synergies from Interdisciplinary Perspectives, eds J. Simonsen, J. O. Baerenholdt, M. Büscher, and J. D. Scheuer (Abingdon, VA: Routledge), 79–94.

Pettersson, R. (2002). *Information Design.* Amsterdam: John Benjamins.

Prior, L. (2020). Inscribed objects and professional practices: a postscript. *J. Appl. Linguist. Prof. Pract.* 14, 304–308. doi: 10.1558/jalpp.40428

Rorty, R. (1992). *The Linguistic Turn: Essays in Philosophical Method.* Chicago, IL: University of Chicago.

Roth, W. -M., Socha, D., and Tenenberg, J. (2017). Becoming-design in corresponding: Re/theorising the co- in codesigning. *CoDesign.* 13, 1–15. doi: 10.1080/15710882.2015.1127387

Schneider, B. (2002). Clarity in context: rethinking misunderstanding. *Tech Commun.* 49, 210–218.

Schön, D. A. (1983). *The Reflective Practitioner: How Professionals Think in Action.* New York, NY: Basic Books.

Simonsen, J., and Hertzum, M. (2012). "Iterative participatory design," in *Design Research: Synergies From Interdisciplinary Perspectives.* Abingdon, VA: Routledge, 16–32.

Simonsen, J., Svabo, C., Strandvad, S. M., Samson, K., Hertzum, M., and Hansen, O. E. (eds.). (2014). *Situated Design Methods.* Cambridge, MA: MIT Press.