



**ILCEA**

Revue de l'Institut des langues et cultures  
d'Europe, Amérique, Afrique, Asie et Australie

**27 | 2016**

**Approches ergonomiques des pratiques  
professionnelles et des formations des traducteurs**

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## An International Survey of the Ergonomics of Professional Translation

*Étude internationale sur l'ergonomie chez les traductrices et traducteurs  
professionnels*

**Maureen Ehrensberger-Dow, Andrea Hunziker Heeb, Gary Massey, Ursula  
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**Electronic version**

URL: <http://journals.openedition.org/ilcea/4004>

DOI: 10.4000/ilcea.4004

ISSN: 2101-0609

**Publisher**

UGA Éditions/Université Grenoble Alpes

**Printed version**

ISBN: 978-2-84310-336-0

ISSN: 1639-6073

**Electronic reference**

Maureen Ehrensberger-Dow, Andrea Hunziker Heeb, Gary Massey, Ursula Meidert, Silke Neumann and Heidrun Becker, « An International Survey of the Ergonomics of Professional Translation », *ILCEA* [Online], 27 | 2016, Online since 08 November 2016, connection on 19 April 2019. URL : <http://journals.openedition.org/ilcea/4004> ; DOI : 10.4000/ilcea.4004

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*We would like to express our appreciation to the translators from around the world who participated in the survey and to acknowledge the support in the form of interdisciplinary grants from the Swiss National Science Foundation (2013–2015) as well as from the Zurich University of Applied Sciences. We would also like to thank the anonymous reviewers for their careful reading of our article.*

## Introduction

- 1 The increased and increasing technologization of professional translation in recent years has led to it becoming, as O'Brien (2012) rather provocatively puts it, a form of human-computer interaction. Other translation scholars have highlighted the importance of the system that translators find themselves embedded in, which includes not only the technological aids but also the physical setting and social environment (Olohan, 2011; Risku, 2014). This notion of embeddedness is consistent with conceptualizations of translation as a situated activity and can help us understand the role of tools and context in the translation process and their impact on the quality of the product (Risku, 2010). It is also congruent with the description of translation in the emerging field of cognitive translology as an enactment of situated, embodied, and distributed cognition (Muñoz, 2010). Adopting such a position seriously means that the physical, cognitive, and organizational factors that impinge on translators as they do their work and make their decisions have to be taken into consideration in order to truly understand the activity.

This is exactly the type of insight an ergonomic perspective on translation can offer (Lavault-Olléon, 2011).

- 2 According to the International Ergonomics Association (IEA),<sup>1</sup> ergonomics, or human factors, encompass the “physical, cognitive, social, organizational, environmental and other relevant factors” with a view to understanding “interactions among humans and other elements of a system”. The IEA refers to three main areas of interest: physical, cognitive and organizational. They define *physical ergonomics* as “human anatomical, anthropometric, physiological and biomechanical characteristics as they relate to physical activity.” Research in the 1990s culminated in good practice recommendations for computer workstations and office ergonomics (Salvendy, 2012, or ISO 9241<sup>2</sup>), many of which are relevant to translators. For example, typing, accepting translation memory matches, and searching for information on the internet are all typical activities that involve the human anatomy as well as the brain. Repeated movements such as switching between the keyboard and computer mouse or clicking can cause overload in muscles not just of the hands and lower arms but also of the upper extremities and back. Since translation is a seated, indoor activity, physical factors such as the design of desks and chairs as well as ambient noise and lighting can also influence the performance of translators.
- 3 The term *cognitive ergonomics* has generally been associated with the design, organization, and operation of user interfaces, the assumption being that interfaces that are in alignment with natural cognitive processes will be easier to use, leading to fewer errors and more efficient performance (Chevalier & Kicka, 2006). As the new international standard for translation services (ISO 17100: 2015<sup>3</sup>) makes clear, language technology tools and resources are an integral part of professional translation activities. This increased use of language technology tools has led to a growing interest in their possible impact on cognitive processes and translation products (Christensen, 2011). However, potential cognitive ergonomic issues extend beyond the use of translation aids to working conditions, time management, and emotions (Ehrensberger-Dow & Massey, 2014; Hansen, 2006; Szameitat *et al.*, 2009).
- 4 Understanding translation as a situated activity involves not only the physical and cognitive factors but also how translators interact with, and adapt to, their organization and environment. This can be understood in terms of *organizational ergonomics*, which according to the IEA “is concerned with the optimization of sociotechnical systems, including their organizational structures, policies and processes”. Previous workplace research has shown that professional translators’ autonomy can be constrained by the system they are operating within, thus possibly limiting their creativity, which is the value-added element of human translation (see Ehrensberger-Dow & Massey, 2014, for examples). The focus of the present study therefore lies on exploring how the physical, cognitive, and organizational ergonomics of professional workplaces relate to translation processes and practices. Specifically, it attempts to identify the key ergonomic issues associated with different employment positions (freelance, commercial, or institutional translators), since they are assumed to be subject to different organizational constraints.
- 5 The methodology chosen for the study was a quantitative survey inspired by Katan’s (2009) work on translators’ status and images of themselves as professionals. It also drew on a more recent survey of professional translators’ and post-editors’ attitudes to their editing interfaces (Moorkens & O’Brien, 2013). As Sun (2016: 270) points out, the face and content validity of survey items is often assessed by expert judgment. In the survey

described below, items were constructed based on the recommendations for good ergonomic practice for computer-related office work derived from the literature (Chevalier & Maud, 2006; Lavault-Olléon, 2011; de León, 2007; Salvendy, 2012) and from guidelines published by insurance companies (SUVA, 2010) and governmental agencies (CCOHS, 2011).

## Description of survey and participants

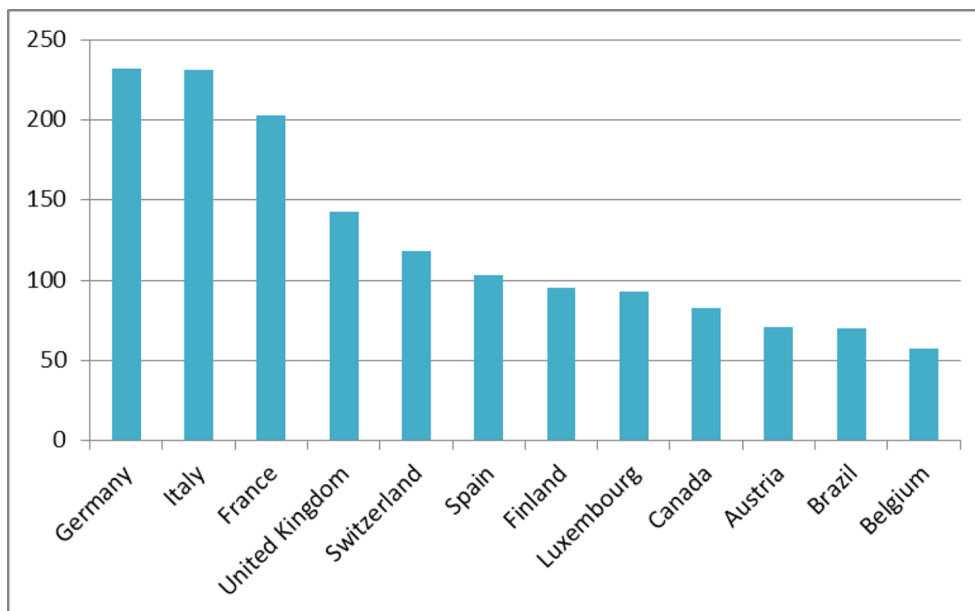
- 6 In order to probe the various aspects of ergonomics defined by the IEA and explained in the previous section, a team of translation studies and occupational therapy researchers designed a questionnaire with items divided into six sections: 1) general information; 2) workspace and environment; 3) computer workstation; 4) tools and resources; 5) workflow and organization; and 6) health and related issues (see Table 1 below for an overview of the categories and items). The conditions for participating in the survey were the following: agreement to the consent form presented at the beginning of the survey, being at least 18 years of age, and working as a translator. The number of compulsory items (see the asterisked items in Table 1) was kept to a minimum in order to increase the likelihood that the respondents would not abandon the questionnaire part-way through. In addition to the conditional items for survey participation, questions were included that would allow comparisons of interest to be made.
- 7 The questionnaire items had been formulated and pilot-tested in English in a previous study with freelancers and commercial translators (see Ehrensberger-Dow & O'Brien, 2015), and then adapted so as to be appropriate to institutional translators' settings as required. The final English version was translated into five other languages (de, es, fr, it, pt) by professional translators. The translated items were checked by another language professional and revised as necessary in a process of adjudication, as recommended by Harkness (2003, 2011). Finally, the questionnaire items were entered into six parallel versions using a licensed online survey tool.

Table 1. – Overview of survey items.

	Section	Items	Items (in the order they appeared in the survey)
1	General information	11	hours per week as a translator*, directionality*, other job*, country*, age range*, sex*, handedness*, typing ability*, employment position*, place of work, shared workspace*
2	Workspace and working environment	19	dedicated workplace, desk size, desk height, sitting/standing position, leg room, space behind chair, elbow position, control over environment (temperature, fresh air, airflow, lighting, window), satisfaction with workspace layout, use of headphones, potential distractions (outside noise, inside noise, people, communication, glare)
3	Computer workstation	14	type, peripherals, number of screens, position of screen, height of monitor, screen size, adequacy of screen size, distance to screen, magnification, mouse, touchpad, wrist rest, keyboard, keyboard shortcuts
4	Tools and resources	7-14	workflow software, number of CAT tools* (if 1 or more: helpful, switching frequency, switching disruptive, default, customizing, irritating features, missing features), ST/TT display, pen & pencil use, additional resources, internet connection, adequacy of communication tools
5	Workflow and organization	6	discuss problems with others, feedback about quality, clarity of deadlines, autonomy at work (when, breaks, which jobs, order of jobs), break behavior, time pressure
6	Health and related issues	8	general health, exercise, health problems (15 different ones), relationship of problems to work, stress due to work, coping with stress, previous ergonomic consultation, desired ergonomic improvements
*compulsory items			

- 8 Shortly after the public announcement of the survey at the 2014 conference of the International Federation of Translators in Berlin, explanatory cover email messages in the appropriate language (see Appendix A for the English version) and a link to the online survey were sent out to professional organizations, language service providers, institutions, personal contacts, blogs, and other multipliers throughout the world. By the end of 2014, a total of 1,850 translators from almost 50 countries had completed the survey, with more than 50 responses from twelve countries (see Figure 1).

Figure 1. – Countries with highest number of respondents to survey.



- 9 Most of the respondents worked more than 20 hours a week as a translator (79%), were between 26 and 55 years old (78%), were women (79%), and were right-hand dominant (86%). Rather surprisingly for such a keyboard-intensive activity, only 52% of the translators said that they were touch typists, with no difference between younger (i.e. 18–45 years old) and older translators (46 years old and over).
- 10 By far the majority of the respondents worked as freelancers (78%), although almost 250 translators working at institutions (13%) and over 160 working at commercial enterprises (9%) also responded to the survey.<sup>4</sup> The freelancers were significantly more likely to have another job (30%) than either the commercial or institutional translators (20% and 17%, respectively;  $p < 0.001$ <sup>5</sup>), although there was no difference between younger and older translators in this respect.
- 11 With respect to directionality of the translation versions among the respondents, less than 60% of them overall reported that they translate exclusively into their first language (L1), with the rest translating into a second language (L2) at least some of the time. There was no significant difference in the age groups (see Table 2) in the relative proportions translating only or mostly into L1, translating more or less in equal amounts into L1 and L2, or translating mostly or only into L2. However, there was a significant difference when it came to the analysis by employment position, with the highest proportion translating only into their L1 among the institutional translators (67% vs. 55% of the freelancers and 52% of the commercial translators;  $p < 0.001$ ).

Table 2. – Overview of language directions (% per group).

	Only into L1	Mostly into L1	About the same into L1 and L2	Mostly into L2	Only into L2
Overall	57%	27%	10%	5%	1%
By age group					
• 18-45	58%	28%	9%	5%	1%
• 46+	55%	26%	13%	6%	1%
By position					
• freelancer	55%	28%	12%	5%	1%
• commercial	52%	28%	7%	11%	1%
• institutional	67%	22%	5%	4%	2%

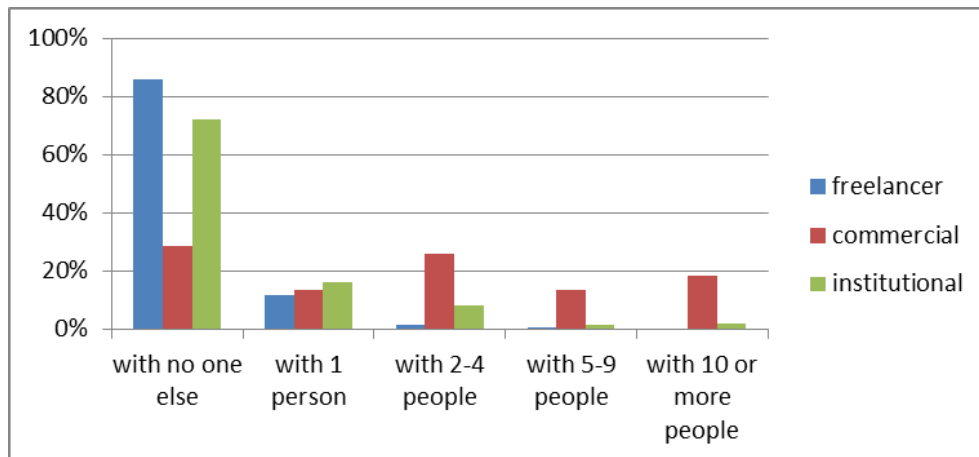
- 12 The survey results discussed in the following sections are presented in roughly the order of presentation in the survey, with differences between groups highlighted when relevant. The physical ergonomics of the translators' workplaces are presented in the next section, followed by the results of items concerning the computer workstation and tools, the translation workflow and resources, and the health issues that might be linked to the ergonomics of the workplace.

## Physical ergonomics of translators' workplaces

- 13 The items in the survey about the physical ergonomics of the workplace related to furniture, seating arrangement, control over the environment, and distractions from noise, light or people. In answering the questions, the translators were asked to consider the workplace at which they did most of their translations. The responses differed significantly depending on position, with 94% of the freelancers working at home and the majority of commercial and institutional translators working in an office outside their

home (83% and 92%, respectively;  $p < 0.001$ ). However, there was an unexpected degree of similarity in the office situation of freelancers and institutional translators: most of them worked alone, whereas far fewer of the commercial translators did so, being more likely to share office space with at least one person or, at times, even more than 10 other people (see Figure 2;  $p < 0.001$ ). This variable obviously has serious implications for ergonomic aspects such as ambient noise and distractions, as discussed further below.

Figure 2. – Shared workplaces (freelance, commercial, and institutional translators).



- 14 Most of the translators had a dedicated workspace, with commercial and institutional translators more likely to have one than freelancers, although the differences were not significant (see Table 3 below for the main results reported in this section). The differences in the physical aspects of the groups' work become more obvious in the responses about the furniture and office layout. Although most of the translators reported that the size of their desk was adequate, this was significantly more likely for those in institutional (89%) and commercial settings (82%) than for the freelancers (77%;  $p < 0.05$ ). The percentage of translators who could choose the height of their desk or working surface was relatively low for both the freelancers and commercials (27% and 30%, respectively), although significantly higher for the institutional translators (38%;  $p < 0.05$ ). Consistent with this, only 11% of the respondents indicated that they sometimes or more often work standing up, which can relieve them from extended periods of sitting. On a more positive note, however, 91% of the translators indicated they had sufficient legroom under their desk, and 85% had enough room to push their chair back at least one meter from their desk. Nevertheless, less than 80% of respondents indicated that they were satisfied with the layout of their workspace, with little difference between the three groups in this regard.
- 15 The commercial and institutional translators had far more ergonomic seating arrangements than the freelancers did. Almost all of them mostly or always used chairs whose height they could adjust, whereas only about three-quarters of the freelancers did ( $p < 0.001$ ). In addition, significantly more of them (75% of the commercial and 81% of the institutional) had adjustable backrests than the freelancers did (57%;  $p < 0.001$ ). Possibly, as compensation for unsuitable chairs, significantly more of the freelancers mostly or always used ergonomic sitting aids such as wedge cushions (24%) than the commercial or institutional translators did (18% and 16%, respectively;  $p < 0.05$ ). Only 24% of the respondents reported that they mostly or always used footrests, and although slightly

fewer institutional translators did, there were no significant differences between the groups. Exercise balls did not seem to be a favored seating option, since 91% of the respondents said that they never used one. Of greater concern, however, was that only 63% of the translators had their elbows at the recommended horizontal position relative to the desk, with 27% of them reporting that their elbows were usually lower than the desk. Again probably related to the more ergonomic chairs (and less to the adjustable desk height), the commercial and institutional translators were significantly more likely than the freelancers to have their elbows horizontal, which reduces strain on the back and shoulders ( $p<0.05$ ; see Table 3 below, with the highest values marked in bold).

Table 3. – Items related to the physical ergonomics of the workplace, by position (%).

	Overall	Freelancer	Commercial	Institutional
<b>Workspace and desk:</b>				
• dedicated workspace	84%	82%	90%	<b>93%</b>
• desk size adequate	79%*	77%	82%	<b>89%</b>
• choice of desk height	29%*	27%	30%	<b>38%</b>
• at least sometimes work standing up	11%	10%	<b>17%</b>	13%
• sufficient legroom under desk	91%	91%	90%	<b>93%</b>
• sufficient pushback room	85%	<b>86%</b>	81%	84%
• satisfied with layout	78%	<b>79%</b>	74%	76%
	Overall	Freelancer	Commercial	Institutional
<b>Seating:</b>				
• chair height adjustable	78%***	74%	<b>94%</b>	93%
• adjustable backrest	63%***	57%	75%	<b>81%</b>
• ergonomic sitting aids	22%*	<b>24%</b>	18%	16%
• footrest used mostly or always	24%	25%	<b>28%</b>	19%
• elbows horizontal to desk	63%*	61%	<b>77%</b>	69%
	Overall	Freelancer	Commercial	Institutional
<b>Control over environment:</b>				
• room temperature	74%***	<b>80%</b>	48%	53%
• fresh air	95%*	<b>98%</b>	77%	87%
• airflow	84%***	<b>91%</b>	53%	65%
• lighting	95%	<b>98%</b>	83%	90%
• view out of window from desk	87%	<b>88%</b>	80%	<b>88%</b>
	Overall	Freelancer	Commercial	Institutional
<b>Distractions:</b>				
• outside noise rarely or never disturbing	72%***	<b>76%</b>	64%	54%
• inside noise rarely or never disturbing	85%***	<b>90%</b>	61%	70%
• headphones rarely or never used	85%	<b>86%</b>	69%	<b>86%</b>
• glare or reflection on screen rare or never	83%	<b>84%</b>	78%	80%
• people rarely or never moving around	62%***	<b>71%</b>	34%	31%
• communication rarely or never disturbing	28%	28%	29%	<b>31%</b>

\* $p<0.05$  ; \*\*\* $p<0.001$

- 16 The ergonomic effects of having to share an office were obvious in the responses to the items about control over the environment (see Table 3). Although almost three-quarters of the respondents indicated that they could control the temperature of their working space, this was true of significantly more freelancers (80%) than of commercial (48%) or institutional translators (53%;  $p<0.001$ ). The control over fresh air and airflow was also significantly higher for the freelancers than for the other groups ( $p<0.01$  and  $p<0.001$ , respectively), with commercial translators reporting the least control proportionately. This was also the case with control over lighting and the possibility of looking out of the window from the desk, although the differences between groups were not significant.
- 17 There were also differences among the groups with respect to ambient noise and other potential distractions. Whereas more than three-quarters of the freelancers (76%) rarely or never found outside noise disturbing, far fewer of the commercial and institutional translators did (64% and 54%, respectively;  $p<0.001$ ). The latter were particularly sensitive to noise from outside the office, perhaps because most of them have private offices and are otherwise more accustomed to quiet. Few of the freelancers reported being disturbed



by inside noise, whereas significantly more of the commercial and institutional translators did (61% and 70%, respectively;  $p < 0.001$ ). Nevertheless, the institutional translators were just as likely as the freelancers to rarely or never use headphones to block out noise. The commercial translators were more likely than the other groups to use headphones for this reason, presumably reflecting their increased exposure to ambient noise, although the differences were not significant. The same was true of the responses to the item about disturbing glare or reflection on the screen, which were slightly more likely for the commercial translators. Of much more concern to the commercial and institutional translators, however, were distractions caused by people moving around, since many reported that they sometimes or often found that colleagues or other people walking around or chatting nearby distracted them from work, which is significantly different from the freelancers (71% reported rarely or never being distracted this way;  $p < 0.001$ ). This was in contrast to communication such as incoming emails, chats, and phone calls, which all three groups find equally disturbing.

## Computer workstations and tools

- 18 The items concerning computer workstations included those related to the hardware, such as the screen and input peripherals, as well as the compulsory question about the use of computer-aided translation (CAT) tools. The majority of the respondents worked on a desktop computer, but there is a highly significant difference between the groups ( $p < 0.001$ ; see Table 4 below, with largest values indicated in bold). Far more commercial and institutional translators used desktops (75% and 82%, respectively) than freelancers (56%). Of the respondents who used laptops to do most of their translation work, 70% used a separate mouse. However, relatively few had a separate screen (34%) or a separate keyboard (37%). This suggests that many of the respondents are making serious compromises with respect to their working posture, since either the laptop screen or the keyboard can be placed in an ergonomic position in relation to the head and arms, but not both. The generally recommended position for the upper edge of the monitor is slightly below eye level, yet fewer than half of the freelancers (39%) had their computer workstation set up that way. The proportion was even lower with regard to the commercial and institutional translators, which is perhaps related to the relatively higher use of CAT tools in these groups (see below) since the primary focus of translators' attention is directed to the lower part of the screen where the input area for target text of most of the common translation memory tools is located. This might prompt translators to have their screens slightly higher than is recommended for general computer use.<sup>6</sup> The position of the screen relative to the translator (i.e. directly in front) was not a problem for any of the groups, although only 68% of them had it at the correct distance. This might be related to the use of laptops, although the proportions do not match perfectly.
- 19 The proportion of respondents using two screens, which is recommended practice for heavy computer users, was relatively low overall (30%), although significantly more likely for the commercial and institutional translators (47% and 45%, respectively) than for the freelancers (25%). More than 80% of the translators had at least one screen that was larger than an A4 sheet of paper (i.e.  $>20 \times 30$  cm, which was used as a concrete reference because the survey respondents were not expected to know the exact size of their screen or to have a ruler handy to measure it). Yet again, this was much more likely to be the

case with the commercial and institutional translators (91% and 93%, respectively) than the freelancers (78%), suggesting that many of the latter group are working not only primarily on laptops but also that they use models with small keyboards, which can have non-ergonomic consequences for the position of their hands, wrists, and shoulders.

- 20 The smaller screens might also be a problem for translators who generally have the source text (ST) on the left of the screen and the target text (TT) on the right (55% overall), which is the standard layout for one of the most commonly used CAT tools on the European market. The second most commonly used layout was the ST on the top and the TT on the bottom (15% overall), which could also be a problem on small screens. The third most frequent organization of ST and TT was overwriting a copy of the ST (12%), which would be less of a problem on a small screen. Respondents clearly appear to find solutions that work for them, since 91% of them reported that they found the size of their screen(s) mostly or always adequate to their needs. Nevertheless, the magnification of text on their screens must be somewhat problematic, since many of them adjusted it (41% overall).

Table 4. – Items related to the computer workstation, by position (%).

	Overall	Freelancer	Commercial	Institutional
Computer and screen(s):				
• desktop for most translation work	61%***	56%	75%	<b>82%</b>
• top of monitor slightly below eye level	37%	<b>39%</b>	32%	30%
• screen located directly in front	92%	<b>92%</b>	87%	<b>92%</b>
• screen about an arm's length away	68%	68%	<b>69%</b>	68%
• two screens for translation work	30%***	25%	<b>47%</b>	45%
• screen larger than A4 (>20x30 cm)	81%***	78%	91%	<b>93%</b>
• screen size mostly or always adequate	91%	<b>92%</b>	88%	89%
• magnification of screen adjusted	41%	41%	40%	<b>45%</b>
	Overall	Freelancer	Commercial	Institutional
Peripherals:				
• keyboard flat on desk	66%	66%	<b>68%</b>	67%
• wrist rest at least sometimes	74%	74%	71%	<b>76%</b>
• keyboard comfortable to use	92%	<b>93%</b>	89%	88%
• ergonomic keyboard	20%***	<b>23%</b>	14%	8%
• keyboard shortcuts at least sometimes	90%	89%	<b>96%</b>	90%
• mouse rarely or never for translation work	13%***	<b>15%</b>	8%	2%
• ergonomic mouse	35%***	<b>40%</b>	22%	15%
• mouse comfortable to use	86%*	<b>90%</b>	76%	76%
• touchpad at least sometimes	17%***	<b>20%</b>	9%	7%
	Overall	Freelancer	Commercial	Institutional
CAT tool use:				
• CAT tool(s) used for translation	73%***	71%	80%	<b>82%</b>
• CAT tool(s) at least sometimes helpful	97%	97%	<b>99%</b>	97%
• rarely or never switch between CAT tools	64%	62%	64%	<b>76%</b>
• switching tools rarely or never disruptive	45%	<b>46%</b>	40%	43%
• customize CAT tool(s)	46%	<b>46%</b>	56%	40%
• CAT tools not irritating	41%*	<b>44%</b>	35%	31%

\*p<0.05 ; \*\*\*p<0.001

- 21 In addition to issues with respect to screen size, the ergonomics of the computer peripherals used for inputting text are very important in the context of work that is as text-intensive as translation. Over half of the respondents (66%) reported that their keyboard was flat on the desk, which reduced unnatural bending of the wrist. Almost three-quarters (74%) reported that they use a wrist rest sometimes, mostly, or always, which can also be helpful in relieving pressure on the wrist and hands during keyboarding. Nearly all of the respondents found their keyboard comfortable to use (92%), with the freelancers slightly more positive than the other groups. But significantly more freelancers (23%; p<0.001) had ergonomic keyboards than commercial (14%) or

institutional translators did (8%), perhaps as compensation for some of the less ergonomic aspects of their workplace presented in the previous section. Positive with respect to the ergonomic use of the keyboard is the high proportion of respondents (90%) who use keyboard shortcuts at least sometimes.

- 22 With respect to using a mouse, there was also a significant difference in the proportion of freelancers (15%) who rarely or never use one for translation work compared with the commercial (8%) and institutional translators (2%;  $p < 0.001$ ). Of the respondents who use a mouse at least sometimes, significantly more of the freelancers (40%;  $p < 0.001$ ) have an ergonomic mouse compared with the commercial (22%) and institutional translators (15%). The freelancers who use a mouse at least sometimes are also significantly more positive about it being comfortable (90%;  $p < 0.05$ ) than the commercial and institutional translators (both 76%). On a side note, 88% of the respondents reported using the mouse with their right hand, although only 85% were right-hand dominant. As an alternative to using the mouse, significantly more of the freelancers (20%;  $p < 0.001$ ) used a touchpad at least sometimes (commercial 9%; institutional 7%), possibly reflecting the increased use of laptops in general in this group. Of those who do use the touchpad at least sometimes, only a small proportion (18% overall) adjust the default settings.
- 23 The use of CAT tools can be assumed to be positive with respect to both physical and cognitive ergonomics because they reduce the amount of keyboarding required to enter text while also eliminating the monotony of having to retranslate sentences and segments that are in the translation memory. Considering this, it is somewhat surprising that only about three-quarters of the respondents use them. The highly significant difference among the groups is attributable to the freelancers, who are much less likely to use them (71%) than the commercial or institutional translators (80% and 82%, respectively;  $p < 0.001$ ). Analysis of the age groups reveals that younger translators (i.e. between 18 and 45 years of age) are much more likely to use CAT tools than the older translators (77% vs. 68%, respectively;  $p < 0.001$ ). Practically all of the respondents who use CAT tools found them helpful at least some of the time (97%) with no differences between the groups. Most of them (64%) rarely or seldom switch between CAT tools, although the 36% who do so at least sometimes might find this somewhat taxing cognitively speaking. Indeed, only 45% of those who switch between tools say that doing so is never or rarely disruptive to their translation process. Although there are various possibilities to customize CAT tools to suit users' needs, less than half of the respondents who use CAT tools (46%) avail themselves of these options. The groups differed in their responses to whether there were aspects of their CAT tools that irritated them: 44% of the freelancers said no, compared with only 35% of the commercial and 31% of the institutional translators ( $p < 0.05$ ). This might be related to self-determination, because freelancers might have chosen their CAT tool(s) themselves whereas commercial and institutional translators might have a particular tool imposed on them by their organizations or project managers.

## Translation workflow and resources

- 24 The responses to the survey indicated that some of the translation processes and workflows might not be as ergonomic as they could be, at least for some of the translators. The groups differed in the variety of modalities used: freelancers (64%) and commercial translators (65%) were more likely than the institutional translators (49%) to

introduce a little variety into their work by alternating between the computer and paper to annotate their source texts by hand at least sometimes ( $p<0.05$ ; see Table 5, with highest values indicated in bold). The groups were all very computer-focused in that they shared the practice of rarely or never doing their draft versions by hand (93%). The groups differed significantly in this respect during the revision process, however. The institutional translators (64%) revise at least sometimes on paper, whereas only 43% of the freelancers and 44% of the commercial translators do ( $p<0.001$ ). The institutional translators (69%) were also more likely than the commercial translators (51%) and the freelancers (35%;  $p<0.001$ ) to revise translations done by other people on paper at least sometimes.

- 25 Overall, the institutional translators seem to have much better conditions with respect to organizational ergonomics, which can have a positive effect in reducing the cognitive load associated with their work. A significantly higher proportion of institutional translators (57%) use software at least sometimes to coordinate and manage their job assignments compared to freelancers (24%), although more than half of the commercial translators do so as well (53%;  $p<0.001$ ). In addition, significantly more institutional translators (81%) have access to additional resources provided by the customer or project manager, such as parallel texts and style guides, than the freelancers (61%) or even the commercial translators (72%;  $p<0.01$ ).

Table 5. – Items related to workflow and resources, by position (%).

	Overall	Freelancer	Commercial	Institutional
<b>Own translation process</b>				
• ST annotated by hand at least sometimes	62%*	64%	<b>65%</b>	49%
• draft version rarely or never done by hand	93%	92%	92%	<b>97%</b>
• at least sometimes revise on paper (own)	46%***	43%	44%	<b>64%</b>
• at least sometimes revise on paper (others)	41%***	35%	51%	<b>69%</b>
	Overall	Freelancer	Commercial	Institutional
<b>Translation workflow:</b>				
• workflow software at least sometimes	31%***	24%	53%	<b>57%</b>
• resources provided at least sometimes	65%**	61%	72%	<b>81%</b>
• internet connection mostly or always good	96%	97%	92%	95%
• communication mostly or always adequate	97%	<b>97%</b>	94%	<b>97%</b>
• discuss work in person at least sometimes	55%***	45%	83%	<b>92%</b>
• discuss work by phone at least sometimes	54%***	51%	47%	<b>72%</b>
• discuss work on forums at least sometimes	43%***	<b>51%</b>	20%	14%
• discuss work by email at least sometimes	78%	78%	72%	<b>83%</b>
• feedback about work at least sometimes	74%	72%	74%	81%
• deadlines for tasks mostly or always clear	95%	<b>96%</b>	90%	95%
	Overall	Freelancer	Commercial	Institutional
<b>Self-determination</b>				
• timing of work at least sometimes	86%***	<b>94%</b>	57%	55%
• which translation jobs at least sometimes	83%***	<b>92%</b>	52%	50%
• order of translation jobs at least sometimes	90%	<b>91%</b>	85%	85%
• timing of breaks at least sometimes	98%	<b>99%</b>	91%	98%
• workspace left for at least some breaks	85%	<b>86%</b>	73%	84%
• hourly breaks at least sometimes	68%***	<b>73%</b>	55%	50%
• time pressure, but not mostly or always	51%*	<b>53%</b>	40%	43%

\* $p<0.05$ ; \*\* $p<0.01$ ; \*\*\* $p<0.001$

- 26 With respect to infrastructure and workflow, all of the groups are supported in their capacity to focus on the translation task at hand and on any research it requires by mostly or always having a good internet connection (96%). Communication tools were also reported to be mostly or always adequate by almost all of the respondents (97%), but are used to varying degrees by the three groups to discuss translation problems. The institutional (92%) and commercial translators (83%) are significantly more likely to

discuss translation problems in person at least sometimes than the freelancers are (45%), even though almost the same proportion of institutional translators and freelancers work in a room on their own (see Figure 2 above). This suggests that institutional translators are more likely to be embedded in a context that allows them to easily interact with others in person. They also seem to seek contact with others, since significantly more of them at least sometimes discuss translation problems by phone (72%) than the other two groups (51% for the freelancers and 47% for the commercial translators;  $p < 0.001$ ). The freelancers seem to compensate for their relative isolation to a certain extent by discussing problems on translation forums (51%) at least sometimes, which seems to be much less an option for the commercial (20%) and institutional translators (14%;  $p < 0.001$ ), perhaps for reasons of confidentiality or constraints imposed by their employers. More than three-quarters of the respondents use email as a means of communication to deal with translation problems at least some of the time (78%), with no significant difference between the groups. Although the proportion of institutional translators who say that they receive feedback at least sometimes about the quality of their work is higher than in the other two groups, the difference is not significant (74% overall). The groups also share their evaluation about deadlines: they are mostly or always clear for almost everyone (95% overall).

- 27 Rather unsurprisingly, the responses from the freelancers indicate that they have far more control over their workday than the other groups. They are significantly more likely to be able to determine the timing of their work at least sometimes (94%) than the commercial (57%) or institutional translators (55%;  $p < 0.001$ ). They are also much more likely to decide at least sometimes which translation jobs they actually do (92%) compared with the commercial and institutional translators (52% and 50%, respectively;  $p < 0.001$ ). Although not significantly different, slightly more of the freelancers indicated that they can determine the order in which they do their translation jobs compared with the other two groups (90% overall).
- 28 In contrast to control over the scheduling of work, almost all of the respondents (98%) reported that they could determine when they take their breaks at least sometimes, and most of them (85%) left their workspace for at least some of their breaks. Much more problematic is the frequency of the breaks: less than three-quarters of the respondents took hourly breaks at least sometimes, with a significant difference among the groups ( $p < 0.001$ ). The freelancers were best off in this regard (73%), perhaps because many of them work alone and feel less pressure to remain at their desks. However, this explanation is difficult to extend to the institutional translators: despite the fact that most work alone, even fewer of them (50%) take hourly breaks than commercial translators (55%). The difference in perceived degree of time pressure might be the more plausible explanation, as 53% of the freelancers reported that they experience time pressure never, rarely, or sometimes, while significantly fewer of the commercial (40%) and institutional translators reported the same (43%;  $p < 0.05$ ).

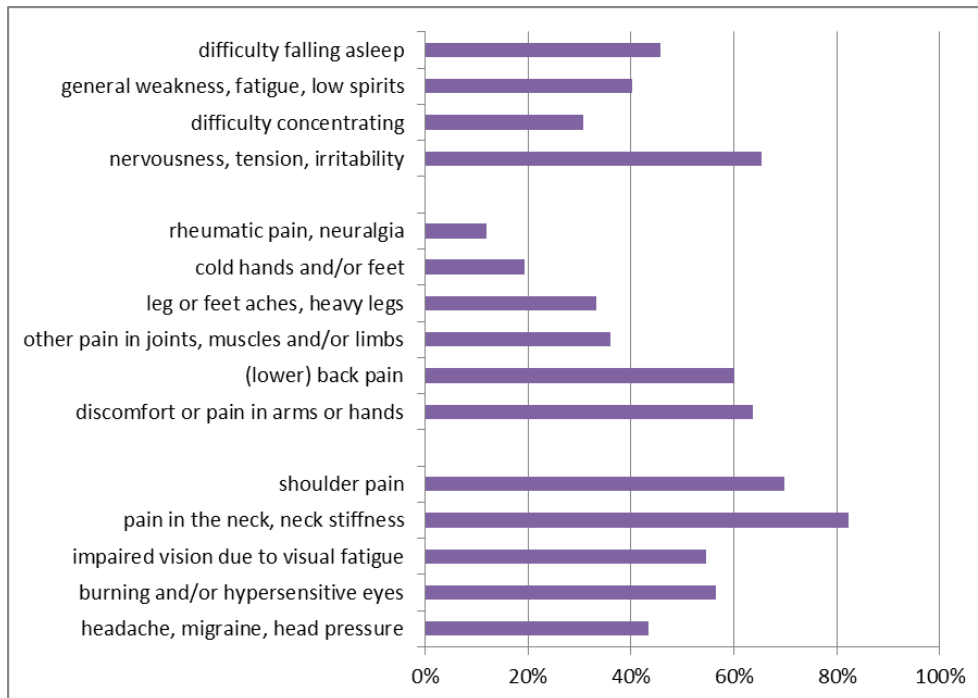
## Health and related issues

- 29 The last section of the survey included general questions about health and well-being, followed by specific questions about medical issues and whether they were felt to be related to work. On a positive note, almost three-quarters of the respondents (74%) reported being in good or very good health, with no significant differences between the

groups.<sup>7</sup> Nonetheless, many of the translators who had experienced health problems in the previous twelve months said that some of those problems were related to work (see Figure 3 below). Some of the most frequent complaints would seem to be directly related to the cognitive effort involved in intensive screen work (e.g. headache, burning eyes, visual fatigue, pain in the neck or shoulder) and the physical consequences of sitting for extended periods at a computer workstation and inputting text (e.g. pain in arms or hands, back pain). Other health complaints (e.g. nervousness, difficulty concentrating, general weakness, sleeping difficulties) might be indications of stress and cognitive overload due to less-than-optimal working conditions, perhaps related to organizational ergonomics.

- 30 This explanation is supported by the fact that over one-fifth (22%) of the respondents said that they mostly or always felt stressed because of their work, with little difference between the groups. Almost the same proportion (21%) reported that they did not cope with stress very well or at all. Although coping mechanisms are beyond the scope of a self-report study such as this one, the responses to the question on frequency of exercise suggest that sports might be one of them. Well over half (64%) of the translators said that they engaged in more than one hour of exercise per week. In a logistic regression analysis, coping with stress and frequency of exercise emerged as key factors in maintaining health (OR=1.4,  $p<0.001$ ).
- 31 A detailed analysis revealed that institutional translators were slightly more likely to attribute health problems to their work than the freelancers or commercial translators were. This could be the result of a heightened awareness of ergonomic issues on their part, since over one-third of the institutional translators (35%) had had the benefit of a workplace ergonomic assessment at some point, compared with only 7% of the freelancers and 29% of the commercial translators ( $p<0.001$ ). Many of the respondents indicated that they would like certain aspects of their workplaces to be more ergonomic (i.e. “user-friendly”), and numerous interesting variations emerged between the groups (see Figure 4; significance levels for the chi-square comparisons are indicated).

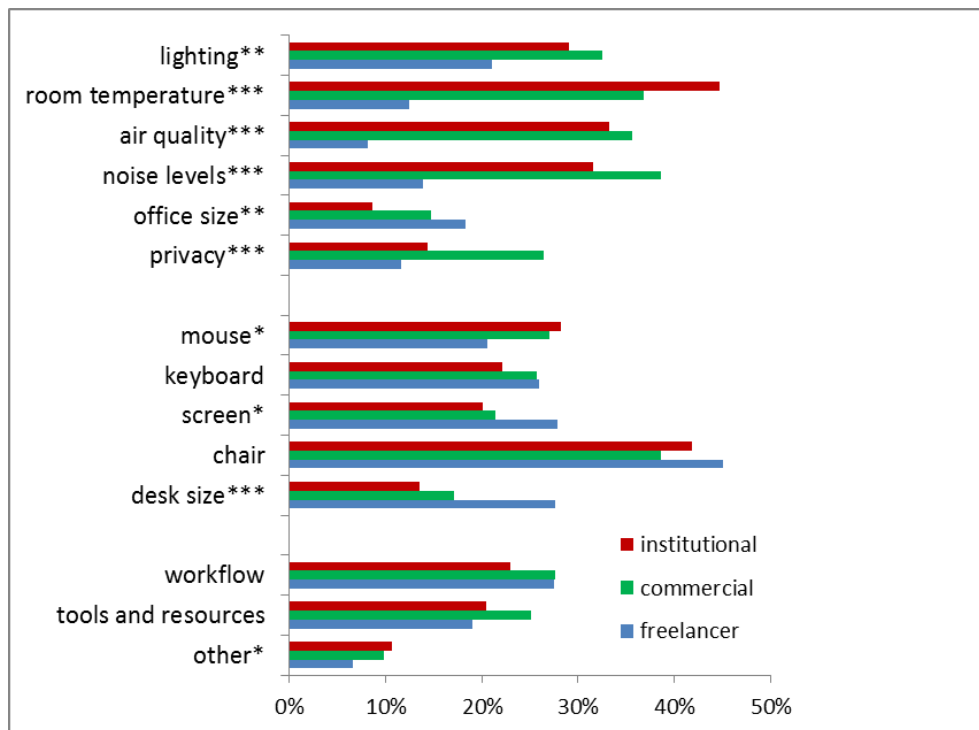
Figure 3. – Proportion of health complaints in last 12 months reported to be related to work (%).



- 32 The differences in what was identified as needing improvement were most pronounced between the freelancers and the other two groups with respect to the ambient conditions of the workplace (Figure 4 below). The institutional and commercial translators indicated more often than the freelancers that they would like more control over lighting and temperature, better air quality, lower noise levels, and more privacy. The only category which the freelancers did name more often than the other groups was the office size, with this apparently being less of an issue for the institutional translators.
- 33 There are fewer significant differences between the groups with respect to office furniture and equipment. The aspect with the most potential for improvement appeared to be the chair, because 44% of the translators chose this from the list provided. Although an ergonomically sound chair can be an expensive investment, almost half of the translators considered this important to their well-being. A significantly higher proportion of the freelancers also recognized that their desk size was problematic, reflecting the findings mentioned above (cf. Table 3 above), and the most frequent additional comment about desks was the desire to be able to work standing up (see also Huysmans *et al.*, 2015). Almost one-third of the freelancers mentioned the screen as an aspect with potential for improvement, whereas this seemed much less of an issue for the institutional and commercial translators (consistent with the significant differences in screen size for the three groups; cf. Table 4 above). About one-quarter of the respondents mentioned the keyboard as an aspect that could be more ergonomic, but there was no significant difference between the groups. In contrast, more of the commercial and institutional translators mentioned the mouse compared with the freelancers. This is consistent with the significantly higher proportion of freelancers who reported having an ergonomic mouse and finding their mouse comfortable to use (cf. Table 4 above). One possible explanation may be that the freelancers attempt to compensate for less-than-optimal office equipment by investing in a more ergonomic mouse. However, it might

actually be more sensible for them to take a lesson from the commercial translators and keep the use of the mouse to a minimum by using keyboard shortcuts more, since that would help prevent the pain in the neck, shoulder, arms, and hands that so many of the translators reported (cf. Figure 3).

Figure 4. – Workplace features that should be more ergonomic (%), by group.



\*p<0.05 ; \*\*p<0.01 ; \*\*\*p<0.001

- 34 To sum up, the results presented above make it clear that the ergonomic profiles of the three groups of translators are diverse. Distinctions emerge among the participant groups in terms of physical workspace, use of computers, peripherals and software tools, health factors, workflow organization and self-determination. Any assessment of translators' ergonomic needs must therefore take employment type and position into account. The implications are considered in the next section.

## Discussion and further directions

- 35 The survey results reveal rather different working conditions and concomitant ergonomic issues among the three groups of participants. With respect to the physical ergonomics of workplaces, the responses to the items such as desk, chair, and computer equipment suggest that freelancers in particular might benefit from paying more attention to the ergonomic aspects of their workplace. Fewer of them have a dedicated workplace, a large enough desk (i.e. at least 120x80 cm), an adjustable desk or chair, or their elbows at the same height as their desks when they are working. Also worrying for potential health issues such as muscle and joint strain, freelancers are almost twice as likely to use laptops compared with the other groups. Only a quarter of the freelancers use two computer screens, whereas almost half of the institutional and commercial



translators do so. More of the freelancers' screens are small, which increases their risk of eye strain, and over half of them have the screens above the recommended height, which can increase the risk of neck strain.

- 36 Overall, the institutional and commercial translators' responses indicate that their workplaces and computer workstations have quite adequate physical ergonomic profiles, which may help to compensate for the constraints and disturbances inherent in sharing office space with others. These include a relative lack of control over the room temperature, amount of fresh air, airflow, and lighting, which can result in low-grade physical discomfort that increases stress levels. These physical aspects are not issues for the freelancers, most of whom work in their own homes and do not share their workspace with anyone else, and may help to compensate for the poorer ergonomics of their equipment. Distractions and disturbances are more related to cognitive ergonomics, since they detrimentally affect concentration. Far more of the commercial and institutional translators reported that they find outside and inside noise sometimes, mostly, or always disturbing. The majority of both institutional and commercial translators are also disturbed by colleagues moving around or chatting. All three groups, however, reported that they were sometimes, mostly, or always disturbed by emails, chats, and phone calls.
- 37 Almost a third of the translators over 45 and just under a quarter of those 45 and under reported that they did not use any CAT tools, and proportionately more of these are freelancers than institutional or commercial translators. This suggests that many freelancers are missing out on the potential advantages of efficiency and consistency that CAT tools can offer. Somewhat surprisingly, freelancers are more likely to use two CAT tools than the other groups, perhaps because of client requirements, which means that they have the extra cognitive effort of switching interfaces between jobs. Indeed, more than half of the translators who switch between CAT tools reported that it disrupts their productivity. Half of the freelancers and institutional translators who use CAT tools keep the default settings instead of exploiting the possibilities that exist to customize the tools. Commercial translators are much more likely to customize their tools, perhaps because they have received special training. Still, greater similarity between the features and interfaces of various CAT tools might help translators focus on their core business. Well over half of the institutional and commercial translators said that there were aspects about their CAT tools that irritated them, and many offered details in the voluntary comment field. Although fewer freelancers seemed bothered, these results still suggest that there is room to improve the ergonomics of these tools and support O'Brien's claim (2012: 115) that "[t]here is little evidence to suggest that tools that are proposed as aids to the translation process have been designed from the point of view of the humans who have to use them."
- 38 Regarding workflow and organization, freelancers are more isolated than others, with resources such as parallel texts and style guides less likely to be provided by the client and with few opportunities available to discuss translation problems with colleagues in person or by phone. This might be partly compensated by their more frequent use of online forums compared with institutional and commercial translators. Although the difference is not significant, the freelancers also receive feedback for their work less often than do the other two groups. The isolation that freelancers experience seems to be the price they must pay for the choice they have in when and how often they work, which translation jobs they do and in what order, and when and where they take their breaks. From the perspective of organizational ergonomics, institutional translators report fewer

workflow-related problems than the other two groups, and have better and more frequent access to workflow software and additional resources, including human feedback interactions. Like the commercial translators, however, they enjoy less self-determination than the freelancers and take fewer breaks than either of the two other groups. Although time pressure might be the reason for this, the institutional translators may not be taking full advantage of their relative freedom in terms of workflow: for instance, far more of the institutional translators reported that they revise their own or someone else's translation on paper, an activity that could be done while standing at a bookcase or a similar piece of furniture at the appropriate level. This would provide an opportunity for the translators to take a micro break as well as to introduce some variety in their working posture.

- 39 As outlined above, there is lots of room for improvement in the ergonomic conditions of translators' workplaces. Some of those changes could be and are being made by translators themselves by changing aspects of their workplaces to suit their needs, as suggested by the relatively high proportion of institutional translators who adjusted the magnification of their screens, of freelancers who used an ergonomic keyboard and/or mouse, and of commercial translators who customize their CAT tool(s). A large proportion of the translators also recognized that certain aspects of their workplaces should be more ergonomic, as evidenced in the responses to the items at the end of the survey.
- 40 The motivation for doing this study was to increase translators' and their employers' awareness of the physical and cognitive aspects of professional translation in order to improve conditions wherever possible. Although not conceived as such, this suggests that participating in the online survey might have been an instance of action research (Nicodemus & Swabey, 2016). Simply by completing the survey, many of the translators seemed to have increased their own awareness of the ergonomic conditions they were working under and potential ergonomic issues at their workplaces. In addition to links to information about office ergonomics, an email address was provided at the end of the survey for respondents to contact the research team. More than 100 respondents made use of this opportunity, and many of them thanked the researchers for studying this important issue. These reactions make it clear that information about workplace ergonomics should be incorporated into translator education and continuing professional development.
- 41 Heightened appreciation of the importance of ergonomic resources, tools, settings, equipment, and organizational systems should also help translators and companies design more efficient and user-oriented workplaces, tools, and workflows. We believe that this will not only decrease the health risks associated with what has always been a desk-bound activity; it will also optimize the ergonomics of increasingly technology-driven workplaces. In turn, this will allow translators to do what they do best instead of wasting their time and energy dealing with non-ergonomic conditions, interfaces, and tools.

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## APPENDIXES

### Appendix A – Introductory email message

Dear (name)

We all know that the ergonomics of workplaces can have an influence on levels of concentration and comfort as well as possibly on creativity and performance. The specific ergonomic conditions that professional translators work under are the focus of a study being carried out by researchers at the Zurich University of Applied Sciences (ZHAW) in Switzerland. By completing and/or distributing the ergonomics survey below, you would be participating in a study that aims at improving the working conditions of translators in the long term.

The survey is available in six languages. It can be accessed by clicking on the preferred language version.

English survey

German survey (Deutsch)

French survey (Français)

Italian survey (Italiano)

Spanish survey (Español)

Portuguese survey (Português)

We would really appreciate it if you forwarded this message to colleagues in your organization and professional network who might also be interested in the ergonomics of professional translation.

Best regards

(name)

## NOTES

1. <[www.iea.cc/whats/index.html](http://www.iea.cc/whats/index.html)>
  2. <[www.iso.org/obp/ui/#iso:std:iso:9241:-11:ed-1:v1:en](http://www.iso.org/obp/ui/#iso:std:iso:9241:-11:ed-1:v1:en)>
  3. <[www.iso.org/iso/catalogue\\_detail.htm?csnumber=59149](http://www.iso.org/iso/catalogue_detail.htm?csnumber=59149)>
  4. Some of the respondents did not choose one of these three categories but instead described their employment status position in the comment field beside the category “other”. On the basis of these descriptions, all but five of the respondents could be coded as freelance, commercial, or institutional translators.
  5. The levels of significance reported here and in the following sections are based on the results of chi-square tests. The total number of responses to each item is not always 1,850 because of the decision to make most of them optional, but this is factored into the expected frequencies method of the chi-square test.
  6. The authors would like to thank Lorenz Mohler, a translator who uses CAT tools and a slightly elevated screen, for this explanation. Just over half of the freelancers (54%) reported that they had the top edge of their screens slightly or quite a bit above eye level, which increases the risk of neck strain. Even more of the institutional and commercial translators reported they did the same (68% and 65%, respectively).
  7. The other choices were “very poor”, “poor”, or “fair”.
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## ABSTRACTS

Despite the fact that professional translation is characterized by human-machine interaction, the ergonomics of the professional translation workplace is relatively under-researched. In order to gain further insights into how translators worldwide have set up and organized their workplaces, an anonymous online survey was developed by a team of researchers in translation studies and occupational therapy as part of an interdisciplinary project. It was made available in six languages (English, French, German, Italian, Portuguese, and Spanish) and distributed through multipliers such as professional organizations. The interest that this topic generated in the professional community was reflected not only in the large number of completed questionnaires (1,850) but also by the comments provided by translators both in the survey itself and in email messages to the research team. This paper reports on the findings of the survey with a focus on differences existing among commercial, institutional, and freelance translators in different countries and the degree to which language technology is involved in professional translation. Findings are compared to good practice recommendations for computer work, and conclusions are drawn with respect to health issues related to suboptimal ergonomics.

Alors même que la traduction professionnelle se caractérise par une interaction entre l'humain et la machine, l'ergonomie chez les traductrices et traducteurs professionnels reste un domaine relativement peu exploré. Dans le but de recueillir des informations sur la façon dont les traductrices et traducteurs à travers le monde ont agencé et organisé leur poste de travail, des chercheuses en traductologie et en ergothérapie ont réalisé une étude en ligne anonyme dans le cadre d'un projet interdisciplinaire. Traduit en six langues (français, anglais, allemand, italien,

portugais et espagnol), le questionnaire relatif à cette étude fut envoyé par des multiplicateurs, par exemple des organisations professionnelles. L'intérêt suscité par la question au sein de la communauté professionnelle se reflète dans le grand nombre de questionnaires complétés (1 850), mais aussi dans les commentaires formulés par les traducteurs dans l'étude elle-même et dans les courriels adressés à l'équipe de chercheuses. Le présent article expose les résultats de l'étude et met l'accent sur les disparités entre traducteurs commerciaux, institutionnels et indépendants dans les différents pays et sur le degré de pénétration de la technologie langagière dans la traduction professionnelle. Les résultats font l'objet d'une comparaison avec les recommandations en matière de bonnes pratiques dans le travail à l'ordinateur et servent de base à l'analyse des problèmes de santé liés à une ergonomie insuffisante.

## INDEX

**Keywords:** professional translation, cognitive ergonomics, physical ergonomics, organizational ergonomics, language technology

**Mots-clés:** traduction professionnelle, ergonomie cognitive, ergonomie physique, ergonomie organisationnelle, technologie langagière

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