

## **THE ATTITUDE OF DICTIONARY USERS TOWARDS AUTOMATICALLY EXTRACTED COLLOCATION DATA: A USER STUDY**

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The paper is based on a survey conducted within the framework of the basic research project *Collocations as a Basis for Language Description: Semantic and Temporal Perspectives* (KOLOS; J6-8255). It presents a qualitative analysis of a user evaluation of the interface of the *Collocations Dictionary of Modern Slovene* (CDS). It discusses an alternative perspective—the user's point of view—on problematic aspects of individual dictionary features, which require further lexicographic analysis and discussion. The collocations user study presents a model of the process of user evaluation; its findings are significant primarily for determining problems encountered by users. They also serve as a useful basis for methodology improvements in future, comparable lexicographic user studies and analyses.

**Keywords:** collocations dictionary, responsive dictionary, user evaluation, attitude towards errors, dictionary interface

## 1 INTRODUCTION

In the digital world, a dictionary is increasingly becoming a network of dynamic shifts between different language information and resources, as well as a testing ground for various contemporary conceptual lexicographic approaches. The concept of a “responsive dictionary”—a dictionary characterised by its capacity to respond to the dynamics of language development and include the interested language community in the development of language resources in a methodologically transparent manner (Arhar Holdt et al., 2018)—first came to fruition (both in Slovenia and internationally) with the *Thesaurus of Modern Slovene*.<sup>1</sup> The responsive dictionary was created as a reaction to the language needs and desires of the modern community of users. The innovative characteristics of the Thesaurus, such as open-access, flexibility, and interconnectedness, provided an alternative to already established dictionary forms. The unique character of *The Collocations Dictionary of Modern Slovene*,<sup>2</sup> the second example of a responsive language resource and the topic of this paper, introduced a new dynamic in Slovene lexicography: its basic design follows the original concept of a responsive, linear (but not only) lexicographic structuring, bends established lexicographic surfaces and both shifts and transcends traditional lexicographic patterns.

In addition to coming up with an alternative dictionary form, modern lexicography has increasingly recognised the undeniable value of dictionary users. Despite the growing interest of international lexicographers in user studies, in Slovenia the field remains understudied and overlooked. This is why the

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1 The Thesaurus of Modern Slovene was published in March 2018 and was compiled automatically. It contains 105,473 headwords and 368,117 synonyms with links to the Gigafida Corpus of Written Standard Slovene; it is freely accessible at: <https://viri.cjvt.si/sopomenke>; the database is freely accessible at CLARIN.SI under the CC BY-SA 4.0 licence: Krek, Simon; et al., 2018, Thesaurus of Modern Slovene 1.0, Slovenian language resource repository CLARIN.SI, <http://hdl.handle.net/11356/1166>.

2 The *Collocations Dictionary of Modern Slovene* was published in October 2018 and is based on automatically extracted data. It contains 35,989 headwords, 7,717,561 collocations, and 36,736,168 examples from the Gigafida Corpus of Written Standard Slovene; it is freely accessible at: <https://viri.cjvt.si/kolokacije>; the database is freely accessible at CLARIN.SI under the CC BY-SA 4.0 licence: Kosem, Iztok et al., 2019, *Collocations Dictionary of Modern Slovene CSD 1.0*, Slovenian language resource repository CLARIN.SI, <http://hdl.handle.net/11356/1250>.

present study examines the role of user reception and contribution to the upgrades and improvements of dictionaries. The idea of a responsive dictionary recognises the user as an active co-creator of (digital) language resources, as well as a critical evaluator of the features offered. The results of an open discussion between linguists and users represent a useful starting point for further analysis of the design of dictionaries, and, in the present case, of the general role of the collocations dictionary as a responsive dictionary within the field of lexicography.

The present study focuses on the users' attitudes towards automatically extracted collocation data, especially in relation to specific features introduced into lexicography by responsive dictionaries. In their initial phase, responsive dictionaries are automatically compiled and relatively quickly published for public use; alongside linguists, the language community then gradually helps improve and clean the data. The *Collocations Dictionary of Modern Slovene* was also immediately made available to the public, i.e. in the initial, unprocessed stage containing noise or errors. The design of the dictionary interface, however, featured options to eliminate these shortcomings (data evaluation and cleaning), information about the linguistic completeness of the entry, and other similar features (Kosem et al., 2018c). The present study was interested in specific groups of users and their attitudes towards the present state of the dictionary, their opinion on its responsiveness (which includes automatic compilation, gradual upgrades, and user involvement), and their response to particular types of existing errors in the data. The user evaluation is intended to serve as a basis for identifying problematic areas, as well as less problematic areas in need of improvement, and will play a key role in the improvement of the collocations dictionary interface.

The paper begins by presenting the method of user evaluation of the *Collocations Dictionary of Modern Slovene 1.0*. This is followed by an analysis of the three thematic segments of the user evaluation, i.e. the three-part design of the evaluation interview. A representative case (proper nouns) demonstrates user perspective on (non-)problematic features of data and the dictionary interface. The conclusion summarizes the key findings of the study and examines the suitability of the applied method as a model for user evaluation in similar lexicographic user studies.

## **2 METHODOLOGY**

### **2.1 Research Framework**

In lexicography, user research has a tradition reaching back to the 1960s (e.g. Barnhart, 1962; Householder, 1967), but the research area was firmly established later in the 1980s and 1990s (e.g. Tomaszczyk, 1979; Hartman, 1987; Atkins, 1998; Nesi, 2000). The emergence of the digital medium in the 2000s offered a vast array of new methodological possibilities (e.g. Bergeholtz and Johnsen, 2013; Müller-Spitzer, 2014; Lew and De Schryver, 2014). More recently, existing approaches were also critically evaluated and surpassed (Boogaards, 2003; Tarp, 2009; Lew, 2015; Kosem et al., 2018a).

Despite growing opportunities for user involvement, Slovene lexicography has been relatively slow in developing an interest in user studies. This is why, as mentioned in previous research (Rozman, 2004; Stabej, 2009; Logar, 2009; Gorjanc, 2017), Slovene lexicography has a glaring lack of data in relation to user habits, needs, capacities, and preferences. Over the past few years, important steps have been taken, such as the development of a user typology (Arhar Holdt et al., 2016), the research of user needs in relation to selected language problems (Čibej et al., 2016; Arhar Holdt et al., 2017), the participation in an international study on user attitudes to general monolingual dictionaries (Kosem et al., 2018a, 2018b), and the development of methodologies for user inclusion and tracking within the framework of a responsive dictionary (Arhar Holdt et al., 2018).

The present study contributes to the available array of tried and tested methodologies (a comprehensive overview of existing methodologies is provided in Welker, 2013a, 2013b) with the addition of user evaluation based on the guided think-aloud method. Think-aloud protocols have been described by Tarp (2009, p. 287) as:

The informants are invited to freely express which reflections and problems they have during the consultation process [while working with a specific dictionary (author's note)]. These »thoughts« are tape-recorded and subsequently transcribed and written down in protocol form. [...] [This method] gives the researcher an idea of the users' way of working as well as what is happening during the process, what users are looking for, what they think they are looking for, and which problems they face when trying to find and interpret the relevant data. A number of research projects performed with this method have provided valuable

results, among others Wingate (2002) who did research into the usefulness of various types of definitions in learners' dictionaries, and Thumb (2004) who focused on the users' different look-up strategies and the problems they faced during the process.

We used the basic idea of the method, but adapted it to serve the purposes of a straightforward evaluative approach: the participants were presented with the dictionary; while they were using it, an interviewer was actively involved, suggesting queries and guiding the “thinking” with a set of prepared questions. Both the audio and the participants' interaction with the screen were recorded. However, only the audio was transcribed and analyzed (as the “protocol” itself was guided and thus comparable).

### **2.1 Research Goals and Sample Structure**

The primary aim of the study was to determine the participants' opinion on the advantages and disadvantages of the *Collocations Dictionary of Modern Slovene* and responsive dictionaries in general, and to find ways of improving its user-friendliness. It was our intention to examine whether adult speakers of Slovene – particularly those with linguistic background or keen linguistic sensibility – know how to use, read and interpret the *Collocations Dictionary of Modern Slovene*, despite the fact that the dictionary featured raw, automatically extracted data. Our focus was on determining the participants' attitudes towards:

- automatic data compilation and errors;
- continuous dictionary upgrades and updates;
- possibility of user inclusion or contribution;
- innovative interface functions.

Following the typology of potential dictionary users (Arhar Holdt et al., 2016), the study included four distinct target groups of participants: translators and proof-readers; teachers of Slovene as a first language; teachers of Slovene as a second or foreign language; and lexicographers. The selected sample covers different scenarios of potential use, which allows the joined feedback on the dictionary to be perceived as more representative. Teachers were included to evaluate the didactic value of the dictionary, primarily its usefulness for teaching vocabulary to students. Translators can benefit significantly from

knowing what collocations and colligations are typical for a given word, while proofreaders need straightforward normative information to support their decisions. Finally, the group of lexicographers was included to identify whether and how their views differ from the opinions of actual dictionary users, e.g. whether as the creators of the dictionary, they perceive its pros and cons similarly to other groups, and whether they propose similar steps for further development than other groups.<sup>3</sup>

**Table 1:** *Structure of the participant sample*

<b>GROUP</b>	<b>Affiliated institutions</b>	<b>Region</b>	<b>Age</b>	<b>Professional experience</b>
10 teachers of Slovene as L1	SŠ Ravne na Koroškem II. gimnazija v MB Ekonomška šola (+gimnazija) Ljubljana	Ljubljanska Podravska Koroška Gorenjska	30–50	10–30 years
10 teachers of Slovene as L2 / foreign language	Centre for Slovene as a Second/Foreign Language (Faculty of Arts, University of Ljubljana)	Hungary Czech Republic Štajerska Ljubljanska Primorska	30–50	10–30 years
10 translators / language editors (proofreaders)	SLG Celje self-employed independent cultural employee	Primorska Dolenjska Savinjska Gorenjska Ljubljanska	30–50	10–30 years
10 lexicographers	CJVT UL FDV UL FF UL self-employed	Ljubljanska Štajerska	30–50	10–20 years

The study included 40 participants. As seen in Table 1, the participants were primarily between 30–50 years of age, with 10–30 years of work experience; they originated from different Slovene regions or—in the case of teachers of Slovene as a second or foreign language—from abroad. The call for participation was circulated widely through various means of communication

3 Students of Slovene as an L1 and learners of Slovene as an L2 did not participate in this step of the study. We chose to focus on adult professional users to make the best of the time and resources available within the project. Compared to the selected user groups, students are more easily accessible and after the project, the study can be continued to include both them as well as other potentially relevant user groups.

(such as mailing lists). The participants responded voluntarily, which needs to be taken into account in the interpretation of the results: the sample consists of participants who are relatively familiar with innovative, digital, and responsive language and dictionary resources, as they use them in their everyday work.

## **2.2 Evaluation Interview: Design**

The evaluation interview was carefully planned and pre-tested on a group of researchers, i.e. linguists and research colleagues assuming the roles of interviewees. Our method was selected in order to enable identification of relevant data communicated in various ways by the interviewee, with minimal interviewer influence; its aim was to detect problems encountered by the interviewee while attempting to complete a specific task—working with a dictionary, on particular dictionary entries. To facilitate internal processing and analysis of acquired data, the participants were guaranteed full anonymity and asked for prior written consent for the recording of their screen and voice.

The approximately 30-minute long evaluation interview was based on a prepared three-part questionnaire (Appendix 1). During the first part of the session, the participants were asked—while thinking aloud—to click randomly in the dictionary and to query entries of their own choice. In this way, they could familiarize themselves with the Collocations Dictionary and form a first impression. At the same time, they were encouraged to spontaneously express their thoughts, feelings, and emotions and report whether they encountered, sensed or noticed any problems. Attention was primarily focused on the participant's capacity to recognize the range of functions and their possible combinations provided by the Collocations Dictionary (visual information on entry completeness, sense menus, various filters, such as frequency filter (showing only either rare or frequent words), or ordering by alphabetical order; collocate clustering, information on collocation relevance, examples of use, links to the Gigafida corpus and other dictionaries, etc.). In this way, we primarily examined attitudes towards functionality, intuitiveness, and user-friendliness of the dictionary.

The second segment of the interview involved working with specific headwords; the participants were guided and tested to determine whether they

recognized the (non-)problematic nature of particular entries. We were interested in their ability to interpret raw data, the amount of problems or errors detected, the nature of these errors, and the levels of distraction posed by the errors. The evaluation included three types of dictionary entries; prior to conducting interviews, we created a list of existing data errors for each entry and thus anticipated the participants' potential observations.

- a) An example of a non-problematic and lexicographically fully examined entry, albeit highly polysemous and thus collocationally diverse: the noun *belina* 'whiteness'.
- b) An example of an entry with only few potentially problematic collocates: the noun *pivo* 'beer'.
- c) Two examples of more problematic entries, with the difficulties expressed either on the level of collocation structure or headword: the noun '*klop*', where most of the collocates are erroneous due to homonymy (*klòp* 'bench', *klòp* 'tick'); and the verb *usesti* (*se*) 'to sit (oneself) down', which appears in inadequate structures due to the absence of the reflexive pronoun *se*.

**Table 2:** *A list of identified errors for the noun headword pivo on the levels of collocates or headwords, syntactic structures and collocations*

Problem	Example in Slovene	Translated example
<b>Errors on the level of collocates or headwords</b>		
The collocate was incorrectly lemmatized.	<i>plata piva</i> instead of <i>plato piva</i>	'plate of beer [cans]' instead of 'box (lit. plateau) of beer [cans]'
The collocate or headword should be in a specific inflected form (such as plural or comparative).	<i>drag od piva</i> instead of <i>dražji od piva</i>	'[expensive] than beer' instead of '[more expensive] than beer'
The collocation did not include the verb morpheme <i>si/se</i> .	<i>nacejati s pivom</i> instead of <i>nacejati se s pivom</i>	'to guzzle beer' [missing <i>se</i> morpheme]
<b>Errors on the level of syntactic structures</b>		
The collocate was tagged with an incorrect part-of-speech.	<i>pivo pite</i> instead of <i>pivo piti</i>	'beer of pie' instead of 'to drink beer'
The verb collocate should appear in the negative form.	<i>piti piva</i> instead of <i>ne piti piva</i>	'to drink beer' instead of 'to not drink beer' [missing negative particle]

Problem	Example in Slovene	Translated example
<b>Errors on the level of collocations</b>		
The collocation is nonsensical as it makes no sense if taken out of context or without additional elements.	<i>pivo k ustom</i> instead of <i>dvigniti kozarec piva k ustom</i>	'beer to the mouth' instead of '[to raise a glass of] beer to the mouth'
The headword appears next to a syntactic structure in the genitive plural or is a plural noun; the collocation makes no sense without an additional, quantitative element.	<i>pivo po tolarja</i> instead of <i>pivo po 300 tolarjev</i>	'beer for tolar' instead of 'beer for 300 tolar'

The third and final segment of the interview examined the participant's opinion on the general usefulness of the dictionary, its digital form (continuous upgrades) and their assessment of its look.

### 2.3 Transcription and Annotation

The annotation of interviews with the participants was done on the transcriptions of audio recordings, which were completed by four students of linguistics. The transcription followed a set of clear guidelines; one of the key guidelines was that the transcription should not be reduced to summarizing, but should instead record the conversations as faithfully as possible, with linguistic adaptation and standardization only permissible on the morphological level.

The annotation process followed the general thematic structure of the questionnaire (Appendix 1). A set of annotation guidelines was prepared, containing a list of available tags, their descriptions, and several examples from the transcriptions. Four annotators were familiarized with the guidelines and assigned 10 transcriptions each. The annotation was made in a local installation of Taguette (Rampin et al., 2019), an open-source online platform for collaborative text annotation (Figure 1). Taguette is an example of computer-assisted qualitative data analysis software (CAQDAS), the aim of which is to facilitate a systematic analysis of unstructured or half-structured data, particularly transcriptions of interviews. It enables multiple annotators to collaboratively annotate each transcription. Relevant text segments are marked either top-down (i.e. the annotators are presented with a set of tags to use during annotation) or bottom-up (i.e. the annotators mark

relevant information with their own tags, which can be easily grouped in the end to achieve the final annotation scheme). There are two main advantages of this approach to qualitative data analysis: a) tagging the transcriptions can provide a quantifiable overview of the data (e.g. the frequency of the tags reveals the most frequently discussed topics, issues, and recurring patterns in the analyzed texts); and b) Taguette is designed in a way that allows segments related to a specific feature to be exported to a separate file, essentially combining all related segments from different transcriptions into a single document. This allows for a more thorough analysis of a specific issue across all participants or participant groups.

Because the interviews in our research were semi-structured and focused on specific features of the *Collocations Dictionary of Modern Slovene*, we elected to follow a top-down approach and prepared a limited tagset for the annotators to use. The higher the frequency of the annotation, the more prevalent or topical the discussed argument in the user group. On the other hand, less frequently annotated topics might indicate that the user either has not noticed a feature or found it less important compared to others.

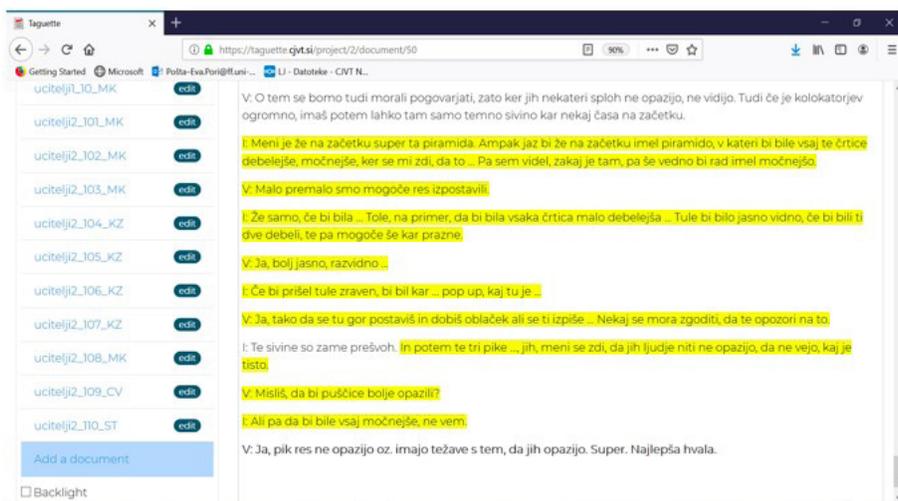


Figure 1: A screenshot of the Taguette annotation platform.

## 2.4 Annotation Results

The annotation typology (shown in Table 3, along with the total frequency of each tag) consists of 4 main categories<sup>4</sup> with multiple subcategories. The table also presents the general attitude towards a specific feature indicating whether the participating evaluators expressed more arguments *pro* or *contra*. These labels are discussed in more detail in Section 3.

**Table 3:** Frequency of annotations by thematic blocks of the interview

Category	Frequency	General attitude
<b>General features</b>		
Automatic compilation <i>Segments related to the participants' opinion on the fact that the dictionary was compiled automatically</i>	27	PRO
Dictionary usefulness <i>Segments related to the usefulness of the dictionary</i>	112	PRO
Look and design <i>Segments related to the overall look and design of the dictionary</i>	37	PRO
Digital form <i>Segments discussing the fact that the dictionary is digital-only</i>	69	PRO
<b>Interface</b>		
Entry phase indicator <i>Segments discussing the phase indicator pyramid symbol in the dictionary</i>	69	PRO
Sense indicators <i>Segments discussing the menu that enables the semantic disambiguation of collocates</i>	43	PRO
Three dot icon <i>Segments discussing the three-dot icon that leads to the list of all collocations with a specific syntactic structure</i>	32	PRO
Filter (frequency) <i>Segments discussing the function that allows the collocates to be filtered by corpus frequency</i>	43	PRO
Filter (alphabetical) <i>Segments discussing the function that allows the collocates to be sorted alphabetically</i>	14	PRO
Filter (relevance) <i>Segments discussing the function that allows the collocates to be sorted by relevance</i>	4	PRO

4 The fourth category – Participant suggestions – was included in the typology as a catch-all category for any user suggestions that did not fit in any of the other (more finegrained) categories. These segments were also annotated in the transcriptions.

Colour scale for relevance <i>Segments discussing the fact that collocates are colour-coded by relevance</i>	56	PRO
Collocate clusters <i>Segments discussing the function to display automatically generated collocate clusters</i>	39	PRO
Links to Gigafida <i>Segments discussing links to the Gigafida corpus of Slovene</i>	39	PRO
Other links <i>Segments discussing other links in the dictionary</i>	14	PRO
Corpus examples <i>Segments discussing corpus examples included in the dictionary</i>	44	PRO
Other resources <i>Segments discussing other resources</i>	12	PRO
Navigation menu <i>Segments discussing the navigation menu that allows the user to filter collocation by syntactic structure</i>	82	PRO
User votes <i>Segments discussing the option for users to up- or downvote collocations</i>	78	PRO/ CONTRA
<b>Noise in dictionary data</b>		
Errors (definite form of adjectives) <i>Segments discussing the lack of definite forms in adjectival collocations</i>	6	PRO/ CONTRA
Errors (homonyms) <i>Segments discussing errors with homonymous headwords</i>	63	CONTRA
Errors (proper nouns) <i>Segments discussing proper nouns included in the dictionary</i>	62	PRO/ CONTRA
Errors (prepositions) <i>Segments discussing errors with prepositions</i>	5	PRO
Errors (comparative form of adjectives) <i>Segments discussing the lack of obligatory comparative forms of adjectives</i>	13	PRO/ CONTRA
Errors (reflexive pronoun) <i>Segments discussing the lack of the reflexive pronoun in collocations containing inherently reflexive verbs</i>	61	PRO/ CONTRA
Errors (missing collocation element) <i>Segments discussing the lack of additional collocation elements in multi-word collocations</i>	59	PRO/ CONTRA
Errors (negative form) <i>Segments discussing the lack of negative forms in collocations that require the presence of a negative particle</i>	17	PRO
Errors (other) <i>Segments discussing other errors related to noise found in the dictionary</i>	136	PRO/ CONTRA
<b>Participant suggestions</b>		
<i>Different participant suggestions regarding the potential improvements of the dictionary</i>	215	

### 3 DATA ANALYSIS OVERVIEW

The initial overview and analysis of categorized opinions included all the structural and thematic segments covered by the evaluation interview (Appendix 1): examining the intuitiveness of the dictionary interface, the participants' attitudes towards errors and selected general features of the dictionary. All the assessed categories mentioned above were divided into groups according to predominant opinion on their adequacy (the category is marked by PRO) or inadequacy (the category is marked by CONTRA) (Table 3).<sup>5</sup> We were interested in determining the areas in which the participants agreed or disagreed. This data is relevant for identifying problematic and less problematic categories, and for further improvements of the dictionary interface.

An example of an opinion<sup>6</sup> marked by PRO:

[1] *“Fantastic! In my opinion, digitalization is the only way of coming up with useful dictionaries.”* [teacher of Slovene as a second/foreign language, on the digitalization in lexicography]

An example of an opinion marked by CONTRA:

[2] *“I’m put off by mistakes, because I find this slows down my work considerably.”* [translator, on automatic noise in dictionary data]

#### 3.1 Evaluating Features of the User Interface

The first part of the interview involved the participant exploring the dictionary features in a free and unstructured manner. The aim was to evaluate the intuitiveness of the user interface, e.g. the entry phase indicator (pyramid icon), the presence or absence of sense indicators (sense menus), the three-dot icon for accessing specific syntactic structures, etc.

As shown in Table 3, the participants from all groups described all the selected features as positive (PRO): they rated them as excellent, highly useful,

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5 For time and resource constraints, we leave the exact distribution of PRO and CONTRA opinions for a future paper on this subject, in which we also intend to analyze the distribution of annotations between users and user groups.

6 In order to facilitate reading, all the participant statements were edited to conform to standards of written language. Where the provided context makes it difficult to discern what the statement (or part of the statement) refers to, an explanation or the concrete referent was added in angular brackets – [ ].

functional and intuitively designed dictionary elements. The participants highlighted the clarity of use and the practicality of individual filters, the inclusion of sense indicators, visual indicators of entry completeness, and especially the links to corpus examples, i.e. the use of collocations in actual language use:

[3] *“These examples, to me, they’re the best thing about this, because I really, really missed them, yes. There’s very few of them in SSKJ [the General Monolingual Dictionary of Standard Slovene], but here you can really... In fact, a single entry gives you a lot of information. That’s great, you can really find whatever it is that you need—a really useful thing, this.”* [teacher of Slovene as a first language, on the relevance of corpus examples]

[4] *“Straight away, I find this pyramid icon great. But I would have a pyramid, from the outset, where all these lines would be thicker, stronger.”* [lexicographer, on the entry phase indicator]

[5] *“I find this great. This thing where everything is sorted according to meaning... Especially for our foreign learners, so they can limit themselves to this, to this single meaning.”* [teacher of Slovene as a second/foreign language, on sense menus in the dictionary]

None of the participants expressed arguments against any of the features. However, we have identified a common suggestion (across all participant groups) for improvement relating to the visual upgrade of the pyramid icon, i.e. the icon should be more noticeable and its function clarified. Divergent opinions (PRO/CONTRA) were noted with regards to the possibility of user involvement. All the participants see the option of up- or downvoting the collocations as a useful and welcome feature; proof-readers and translators, however, pointed out that they often lack time for doing so, whereas the teachers expressed concern about the feature being used by non-competent users:

[6] *“I have very mixed feelings about this. If the idea is that this is only intended for more advanced users, then this is a great option. But if I think of showing this to the children in primary school and then they would click away and play a little, I think they could really spoil this situation here.”* [teacher of Slovene as a first language, on the dictionary’s voting feature]

[7] *“Yes, I definitely find this great. I often notice these mistakes in a lot of places, and others notice them, too, when I’m reading online news, and I notice things being misspelled. But I can’t be bothered to register only to bring attention to the mistake. I mean, if I could do it, I suppose I would, sometimes. So I think it’s great that this here is made in such a way that the user can immediately point out a mistake.”* [teacher of Slovene as a second/foreign language, on the convenience of not having to register to provide user votes]

### 3.2 Evaluating Data Error Distraction

The second part of the interview, which focused on examining the participants' attitudes to various types of errors, demonstrated that the participants—judging by their response to test entries and their self-reports on previous, often-times daily dictionary use—mostly do not seem to notice them. In fact, they seemed to first become aware of the errors only during their participation in the user study, after being guided in their work on specific entries (*belina*, *pivo*, *klop* and *usesti* (*se*), i.e. after being systematically queried whether they noticed any errors and asked about the extent of their disruption.<sup>7</sup>

Prompted by the interviewer, the participants evaluated specific types of errors, such as the absence of the reflexive pronoun *se* in the verb headword, errors due to homonymy, the inclusion of proper nouns in the dictionary, etc. As seen in Table 3, the most distracting type of error occurs due to homonymy and was mostly independently detected by the participants. In the headword *klop*, homonymy results in most of the collocates being wrong (*greti klôpa* 'to keep a tick warm' – instead of *greti klóp* 'to keep a bench warm', *guliti klôpa* 'to wear out a tick' – instead of *guliti klóp* 'to wear out a bench', *sesti v klôpu* 'to sit on a tick' – instead of *sesti v klopí* 'to sit on a bench').<sup>8</sup>

The participants also had mixed opinions (PRO/CONTRA) on the inclusion of proper nouns in the dictionary. Due to the diversity of opinions on this issue and some very interesting results, we examine the issue in more detail in Section 4. The participants marked all the other shortcomings (i.e. types of errors) with CONTRA, and mostly did not notice them independently during their work with dictionary entries, as mentioned above:

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7 It should be noted that the above was not true for the group of lexicographers—unlike the other participants, who encountered such errors for the first time, the lexicographers were well acquainted with the dictionary. Namely, the group of lexicographers included many of the original authors involved in the diverse stages of the building of the collocations dictionary (data processing, user interface design, and other processes of development).

8 Homonymy-related problems can occur because of incorrect morphosyntactic tagging and/or problems in post-processing. One particular issue of corpus data is that lemmas are form-based, so differently-pronounced headwords with the same form will be combined under the same lemma. The problems become particularly noticeable when such a word (as a headword or a collocate) features in the grammatical structure in a case that is not nominative.

[8] *“I don’t know, I wasn’t really distracted... If you hadn’t told me, I wouldn’t even have noticed. I think that as soon as I saw it, I somehow already imagined the correct meaning and then got the meanings of the sort I was thinking about.”* [teacher of Slovene as a first language, on the]

[9] *“These are mistakes of the kind where the petty Slovene mind, which would rather criticise than help or praise, could say: there, I knew it, I found a mistake right away.”* [translator, on dictionary errors]

[10] *“Because, for instance, we’ve been using it [the Collocations Dictionary] now [in class], we’ve had a look at quite a number of things, at least those that were in the texts, and we haven’t found a single mistake, not a single problematic thing. So, I think, well, you really have to try hard to find a page where something bothers you. To the point that you find the page useless.”* [teacher of Slovene as a second/foreign language, on the scarcity of errors in the Collocations Dictionary]

[11] *“Because the user knows in advance [to expect mistakes], I don’t think it’s a problem, no. Because then, even someone who is learning Slovene, they know not to trust it blindly. So I think that even in this stage, this phase, this resource is really valuable.”* [teacher of Slovene as a second/foreign language, on the usefulness of the Collocations Dictionary]

### **3.3 Evaluating General Features of the Dictionary**

In the final part of the interview, the participants evaluated the general features of the collocations dictionary, such as its automatic compilation, digital-only form, and look/design.

As shown in Table 3, all the above features were positively evaluated by all the participant groups. The reasons were mostly unanimous. The participants find the Collocations Dictionary a clear and coherent resource, with relatively clearly recognizable functions; translators and proof-readers see it as an invaluable resource; the teachers consider it an extremely useful one (both for the preparation of didactic exercises and for classroom use, e.g. to check the adequacy of phrases, find expressions typical for newspapers, works of fiction, etc.); its strengths are its authenticity, the interconnectedness of its language data, and the relative ease of use in comparison to corpora. Its look and the distribution and density of data are clear and user-friendly, whereas its digital-only form, which enables continuous upgrades and updates, is functional, indispensable and a necessary precondition for work in modern times.

[12] *"I believe that these two dictionaries [the Thesaurus of Modern Slovene and The Collocations Dictionary of Modern Slovene] are the best thing that has happened to Slovene in the past few years, I really do. And the people are infinitely, truly grateful, for having these resources."* [proof-reader and translator, on their attitude toward responsive dictionaries]

[13] *"So I really enjoyed it today when we could show this to the foreign learners: 'Here, this is the entire selection [of collocates]. There are some things that are not in accordance with the orthography manual, and a newspaper proof-reader might correct a lot of things, but you encounter all of this in every-day language. Everything you see here is real-life language.' So it's great that these dictionaries exist and offer so many options. Because this is what foreigners often experience: 'Well, I heard someone say this on the street, but where can I check if it's OK?' And then, with Fran [Slovene dictionary portal] or, I don't know, the orthography manual, well, there's nothing there. For a foreign learner there's not enough headwords in there. It's much easier to browse through this than it is directly through corpora. I find this dictionary much more user-friendly than corpora."* [teacher of Slovene as a second/foreign language, on the usefulness of the Collocations Dictionary for foreign learners]

[14] *"It's nice and user-friendly, because it's so clean and clear and there's enough space, the page isn't crowded. Yes, I like it and those shades of grey aren't too conspicuous, it's clear, well, I like it. Here, the titles are nicely listed, so you know what you're looking for, down here you get the collocations, great. So I find it ... Well, I'd just like to say well done, really, great."* [teacher of Slovene as a second/foreign language, on the user-friendliness of the Collocations Dictionary]

[15] *"I don't find the fact that it's in digital-only form a disadvantage at all. It's an advantage, really, because it takes less time to access it and precisely because you can correct it, update it, improve it. Because if this wasn't the case, then you could wait forever for such a dictionary, and in the meantime expressions go out of use, or maybe not out of use, but new things come along, the language develops and so the dictionary would be left behind."* [translator, on the advantages of a digital-only dictionary form]

### 3.4 Participants' Improvement Suggestions

While evaluating specific interface features, the participants also suggested several improvements on their own initiative. The suggested improvements included adding information on the collocate or collocation frequency, the option to export data, the addition of accents and pronunciation to headwords (especially homonymous headwords). The bulk of suggestions was primarily concerned with the option to click on the headword in order to return to the initial page, the visual upgrade of specific interface elements, such as upgrading the frequency filter with a color scheme or a color code, making the pyramid icon more graphically pronounced by enlarging it, using intense colors or stripes, including a short headline, description, etc.

#### 4 QUALITATIVE CASE ANALYSIS: PROPER NOUNS

In this section, we describe a qualitative analysis of the participants' attitude towards the inclusion of proper nouns. *The Collocations Dictionary of Modern Slovene 1.0* includes proper nouns as collocates, but not as headwords.<sup>9</sup>

While *the Collocations Dictionary* was under development, lexicographic discussions frequently highlighted the problematic nature of proper nouns. Because they refer to a single, specific referent, they are semantically specific and often bring into question the relevance of the dictionary entry. A typical example of this includes headwords which necessitate a longer sequence enumerating collocates of the same type, e.g. geographical proper nouns: *prestolnica* [*Slovenije, Štajerske, Rusije*] 'the capital of [Slovenia, Styria, Russia]', *bivati v* [*Sloveniji, Rusiji, Ukrajini*] 'to live in [Slovenia, Russia, the Ukraine]', or adjectives derived from proper nouns: [*slovenski, angleški, nemški, češki*] *jezik* '[Slovene, English, German, Czech] language', etc. Aside from data overload, the inclusion of proper nouns may also lead to difficulties by adding potentially recognizable personal names (personal data), trademarks, etc. On the other hand, their complete exclusion may lead to omitting an important segment of vocabulary which, statistically speaking, conforms to collocation criteria (type, frequency, occurrence).

The complexity of this issue and its possible solutions were reflected in the results of the participants' evaluation. Most participants supported the inclusion of proper nouns in the dictionary (see Table 3). However, all the participant groups identified reasons both for and against the inclusion. This was especially pronounced in the group of lexicographers, where all the participants listed reasons both for and against the inclusion. Table 4 gives an overview of the above discussed opinions within individual groups.

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9 However, it should be noted that the Collocations Dictionary does include headwords derived from proper nouns which, in Slovene, begin with lower-case initials (as opposed to many foreign languages in which the opposite is often the case). The dictionary thus contains e.g. adjectives derived from proper nouns, such as *slovenski* 'Slovene', *angleški* 'English', *nemški* 'German', etc.

**Table 4:** An overview of participant attitudes (PRO, CONTRA, PRO/CONTRA) towards inclusion of proper nouns across individual groups

	PRO	CONTRA	PRO/CONTRA
Teachers of Slovene as L1	9	0	1
Teachers of Slovene as L2	9	1	0
Translators, proof-readers	6	3	1
Lexicographers	0	0	10

#### 4.1 Attitude of Teachers of Slovene as a First Language

The majority of teachers of Slovene as a first language (Table 4) had a positive attitude towards the inclusion of proper nouns, especially for the following reasons:

- the students find them more illustrative and concrete;
- they pique the interest of students and promote intellectual and cognitive processes;
- their specificity is attractive and intuitive, which is reflected in increased study motivation of the student and, consequently, in a more flexible understanding and adequate language use.

While giving a positive evaluation of the inclusion of proper nouns because of their ability to illustrate and convey a more specific example of language use, one of the teachers expressed doubts regarding the benefits of including trademarks (e.g. *Laško pivo*, a Slovene beer brand) and questioned their contribution towards understanding word use.

#### 4.2 Attitude of Teachers of Slovene as a Second/Foreign Language

Almost all teachers of Slovene as a second language (Table 4) find the inclusion of proper nouns important because they give useful information on the morphological characteristics of a particular part-of-speech category, such as declension patterns or the use of prepositions with proper nouns (a frequent problem for foreign learners, e.g. *potovati na* [*Hrvaško, Kitajsko*] 'to travel to [Croatia, China]', but *potovati v* [*Evropo, Azerbajdžan*] 'to travel to [Europe, Azerbaijan]'). There was a suggestion to exclude specific types of proper nouns, such as personal names and surnames.

As seen in Table 4, only one of the teachers was of opposed to proper nouns. The teacher pointed out several proper nouns incorrectly spelled with a lower-case initial letter (*večernji list* 'evening newspaper' instead of *Večernji list* 'Evening Newspaper'; *smučati v dolomitih* 'to ski in the dolomites' instead of *smučati v Dolomitih* 'to ski in the Dolomites'), which might cause difficulties for students trying to learn the language. An incorrectly spelled proper noun may mislead a foreign learner who is incapable of recognizing or disambiguating language mistakes; it can provide misleading information on orthography and the role of particular part-of-speech categories and their inflections in phrases and syntactic structures. The above examples may misinform the learner about the proper form and use of the deadverbial adjective (*večernji* instead of *večerni*) or the correct use of the common noun (*Dolomiti* as the Italian mountain range instead of *dolomiti* as a mineral).

#### 4.3 Attitude of Proof-Readers and Translators

6 out of 10 participating proof-readers and translators gave reasons in favour of the inclusion of proper nouns (Table 4). Much like the teachers of Slovene as a first language, they recognised the quality of intuitiveness arising from the concreteness of proper nouns: the collocation *klop Real* 'the bench of Real [Madrid]' or *klop Liverpoola* 'the bench of Liverpool' may be more illustrative and meaningful than *klop prvoligaša* 'first league bench', where the lack of context may make it difficult to determine that this is a football club.

On the other hand, a smaller number of proof-readers and translators—3 out of 10—argued against the inclusion, especially in relation to trademarks (e.g. *Illy kava* 'Illy coffee', *Laško pivo* 'Laško beer'), since they find this degree of specificity meaningless and unnecessary. Furthermore, one of the participants had a mixed opinion, since they believe that the decision regarding the inclusion of proper nouns in the dictionary depends primarily on the type of proper noun and the relevance of the information conveyed by the proper noun.

#### 4.4 Attitude of Lexicographers

As already mentioned above, all the participating lexicographers expressed arguments both for and against the inclusion (Table 4), which is to be expected considering the fact that they see the dictionary not only from the

perspective of the user, but also as content developers and originators of lexicographic concepts.

The arguments for the inclusion were related to semantically relevant proper nouns; the participants stressed that not all proper nouns are equally semantically relevant (*kranjski Janez* 'John Doe' – *Janez Novak*; *delati se Francoza* 'lit. to pretend to be a Frenchman, meaning *to feign ignorance*' – *Francoz* 'Frenchman'). Proper nouns were also considered a valuable source of information on the most typical ways of addressing people, with the caveat that the specific personal name in and of itself is not that relevant (*dragi Janez* 'dear Janez' – *dragi* + [personal name]); the key information here is the discourse category.

The arguments against the inclusion were related to longer sequences of collocates of the same type, since this type of information is distracting and does not enhance user experience. This is the case for the selected entries *klop* and *pivo*, where there is a longer sequence enumerating adjectives derived from proper nouns: [*češko, belgijsko, angleško, dansko*] *pivo* '[Czech, Belgian, English, Danish] beer' or geographical proper nouns (e.g. names of cities): *klop* [*Celja, Maribora, Kopra, Gorice*] 'the bench of [Celje, Maribor, Koper, Gorica]'.

#### 4.5 Participants' Suggestions for Dictionary Improvements

The participants suggested two solutions on the topic of inclusion and presentation of proper nouns in the dictionary.

The proof-readers and translators suggested an introduction of a special button for hiding the proper noun candidates; this would give them the option to choose whether to use it and thus make querying the dictionary more efficient. Their work is related to the specific nature of various text types and vocabulary, the variety of topics subject to intense linguistic research, as well as time as one of the key components, which is why this group believes that the dictionary should adjust to the needs, wishes, and expectations of its target users as much as possible.

Lexicographers proposed a solution of grouping collocates belonging to the same semantic type under a semantic label (e.g. football, hockey, basketball > sport; dog, cat, hamster > (domestic) animal). This would improve the

visibility of collocational behaviour of the word and ease browsing through (long) lists of collocates.

## 5 DISCUSSION AND METHOD ASSESSMENT

The user evaluation of *The Collocations Dictionary of Modern Slovene 1.0* identified the participants' attitudes towards its features, which were grouped in three discrete segments in the research interview. The user evaluation was, to a great degree, positive. In the first segment of the interview, the participants evaluated as positive (i.e. relevant for the dictionary and useful) all the features that they independently recognized. In the guided part of the interview (during which they worked with selected entries), the participants expressed reservations about some (but not necessarily all) data errors, especially mistakes arising as the result of homonymy and ambiguous word inflections. Opinions also differed with regards to the (non-)inclusion of proper nouns (as seen in Section 4). The third and final segment of the interview asked the participants to evaluate general dictionary features; here, also, their opinion was unanimously positive.

The analysis of the participants' attitudes towards errors has demonstrated that even in their initial stage (during which they still contain mistakes), responsive dictionaries represent an invaluable tool—this was a common opinion across all participant groups taking part in the study. In order to understand this degree of positive or permissive attitudes towards data errors, we need to keep in mind that before the publication of the *Collocations Dictionary of Modern Slovene*, collocation data for Slovene had not been readily available. To a great extent, the participants' enthusiasm is thus a reflection of the newly opened possibilities offered by the dictionary—it is, therefore, safe to conclude that the participants prefer easy accessibility over fully clean data. The evaluation further demonstrated that: a) it is vital that dictionary users are alerted to the presence of errors with the pyramid icon, which indicates the phase of entry completeness; and b) given the presence of context, the possibility of accessing examples, and links to the Gigafida corpus, it is possible for the users to resolve any ambiguities.

In terms of dictionary shortcomings, special attention should be given to the most “vulnerable” user groups, i.e. teachers of Slovene as a first language and

teachers of Slovene as a second/foreign language. Teachers bear the responsibility of choosing the sources used in the classroom with students who as language learners are somewhat less qualified to independently identify and resolve data ambiguities in the manner described above. Didactic use demands precise and unambiguous information, so that the teacher does not lose time by having to correct errors. On the other hand, the teachers themselves found the dictionary to be very useful and of great help, especially as a starting point for exercises, a tool for enriching vocabulary, for checking the correctness and adequacy of phrases; for writing fiction and poetry, for discussing collocations, using idioms, newspaper language, etc. They were excited by the authenticity of the language, the interconnectedness of different resources, and especially by the possibility to observe language as a natural phenomenon across all segments of its use.

What is important is that the study made it clear that many of the characteristics that were deemed problematic by linguists are not necessarily problematic for the users—this was seen, for instance, in the discussion of the participants' attitudes towards the inclusion of proper nouns. Contrary to our expectations, the participants found proper nouns to be interesting and illustrative despite referring to a specific referent. Whereas the lexicographers' main concern was that the inclusion may result in overcrowding the dictionary (e.g. in cases where the headword is followed by a long, enumerating sequence of collocates of the same type), the participants found such concreteness more intuitive.

The evaluation identified areas of the dictionary and its interface which the participants find adequate and those that need to be re-examined, improved and further assessed. In this sense, the study achieved its main goal and the selected method proved to be successful. Even though collecting, recording and categorizing evaluation data is extremely time consuming, the transcribed opinions offer insight into problems and solutions that significantly contribute to concepts proposed by dictionary developers. The evaluation study has resulted in a number of positive findings, but also revealed possibilities for improving the methodology in case of further, comparable studies.

One of the positive aspects of the study was its multi-stage design (i.e. interviews – transcription – annotation – analysis): on the one hand, it enabled a

careful and thorough planning of the entire process of the study; on the other, it increased the time needed to realize individual tasks. The study took place between May and September 2019, with the time span depending on several outside factors: the availability and flexibility of the participants, their willingness to co-operate, collaboration with students, and unforeseen technical difficulties. Apart from demonstrating the need to plan for a longer time span, our experience has also shown the following:

- in order to secure participation, it is very important to adopt a personal approach, including personal correspondence, willingness to record sessions in the participants' place of work, etc.;
- collaboration with students demands careful and consistent monitoring of their work, including providing clear and understandable guidelines and a detailed examination of the transcriptions and annotations;
- a methodological process reliant on the use of recording software and equipment and the use of a digital dictionary should take into account potential technological difficulties and provide for adequate data backup.

## 6 CONCLUSION

The user evaluation of the *Collocations Dictionary of Modern Slovene* has proven to be a highly efficient way to detect (non-)problematic dictionary features and represents a solid foundation for further attempts to improve and upgrade the interface to make it more user-friendly and functional. It presents a model for evaluation and identification of user problems; the gathered results reveal areas for potential methodological improvements and are thus useful for similar lexicographic user studies and analyses.

The findings of the study indicate that the methodology of automatic extraction of lexical data has indeed reached the levels where such data can be immediately presented to the users, something that has been often claimed by authors such as Kilgarriff et al. (2013) and others. Nonetheless, what the study also shows is that the presentation of such data matters, i.e. features are needed that alert the users to the different stages of data validation and that enable data manipulation/filtering. Part of the reason for this need lies in the

quantity of automatically extracted data which always exceeds the quantity after human clean up and selection.<sup>10</sup>

As envisaged when preparing the study, the user feedback obtained will be used in the preparation of the next version of the *Collocations Dictionary of Modern Slovene*. First and foremost, we need to acknowledge that no radical changes are needed; to some extent, the aspects of data quality and quantity, as well as clarity of presentation, need to be addressed. For example, we plan to introduce additional options to filter collocates, such as an option to hide proper nouns (as opposed to removing them from the dictionary completely), hiding or downgrading semantically less relevant collocates, and viewing a selection of top collocations (or collocate clusters) regardless of their syntactic structure. In terms of visual improvements, the pyramid icon will be made more conspicuous. In cases where the distribution of collocations over syntactic structures is uneven, structures with more collocations will receive more space in the display. Moreover, an option for downloading entries will be added.

As evidenced by the results of the study, user groups differ in their attitude towards the inclusion of proper names, which makes it difficult to propose universal answers for this issue. Solutions that introduce a choice for the user (as the on/off buttons), seem to be a way to go for such cases. Nonetheless, one feature that seemingly requires a rethink is the option of user participation; to this end, we are already testing other approaches such as gamification, which may help us clean the dictionary data even faster and less obtrusively than existing voting method in the dictionary. And gamification, in combination with improvements to the automatic data extraction method, will make the dictionary even more »responsive«.

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<sup>10</sup> This is also the rationale behind the pyramid icon – wider at the bottom in the initial stages, and narrower at the top when the entry is completed.

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## ODNOS UPORABNIKOV DO AVTOMATSKO PRIDOBLENIH KOLOKACIJSKIH PODATKOV: UPORABNIŠKA RAZISKAVA

Prispevek izhaja iz uporabniške raziskave, izvedene v okviru temeljnega raziskovalnega projekta Kolokacije kot temelj jezikovnega opisa: semantični in časovni vidiki (KOLOS; J6-8255). Prikaže analizo uporabniške evalvacije vmesnika *Kolokacijskega slovarja sodobne slovenščine* (KSSS). Z nekoliko drugačnega gledišča – skozi uporabniški aspekt pokaže, kje in katera so problematična mesta posamezne slovarske kategorije, ki so potrebna nadaljnje leksikografske obravnave in diskusije. Kolokacijska uporabniška študija predstavlja model procesa uporabniškega evalviranja, ugotovitve, ki jih prinaša, pa bodo predvsem relevantne za detekcijo uporabniških problemov, pa tudi za izboljšavo metodologije, kar bo predvsem koristno za primerljive leksikografske uporabniške raziskave in analize.

**Keywords:** kolokacijski slovar, odzivni slovar, uporabniška evalvacija, odnos do napak, slovarski vmesnik



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## APPENDIX 1: EVALUATION QUESTIONNAIRE

### First segment: Free use of the dictionary

During the first interview segment, the participants are asked to browse the dictionary freely while thinking aloud. This allows them to form the first impression and get the general sense of the dictionary.

### Second segment: Guided work with dictionary headwords

In the second part of the interview, the participants are guided by the interviewer to click on a number of headwords that were pre-selected according to a carefully designed set of criteria. The participant is thus familiarized with the various functions offered by the resource.

The participant is presented with the following headwords:

***belina*** 'whiteness' – a non-problematic entry that has already been finalized by lexicographers

How do you find this headword? Is it in any way problematic? Do you notice any errors? Can you identify the various functions available (e.g. the entry phase indicator, sense menus, collocate clusters), the possibility of using various filters, the option to contribute to the dictionary by rating collocations?

***pivo*** 'beer' – an entry with potentially problematic collocates

Do you notice that the noun/adjective (collocate or headword) is not in the expected inflected form? Does this motivate you to refer to the corpus examples provided? Are you bothered by this type of errors (semantic nonsense)?

#### **A selection of the identified errors (on the levels of collocate/headword, collocation structure or collocation):**

- o The collocate is incorrectly lemmatized: *plata piva* 'plate of beer' instead of *plato piva* 'box of beer [cans], lit. plateau of beer cans'
- o The collocate/headword should appear in a specific inflected form (e.g. comparative, plural): *drag od piva* 'expensive than beer' instead of *dražji od piva* '[more expensive] than beer'
- o The headword appears next to a collocate tagged with wrong part-of-speech: *pivo pite* 'beer of pie' instead of *pivo piti* 'to drink beer'
- o The verb collocate of the noun headword does not appear in the negative form (as required by the genitive case of the headword): *piti piva* 'to drink beer' instead of *ne piti piva* 'to not drink beer'

- o The collocation makes no sense out of context or without additional elements: *pivo k ustom* 'beer to the mouth' as in *dvigniti kozarec piva k ustom* 'to raise [a glass of] beer to the mouth'
- o The headword is either a plural noun or appears next to a syntactic structure in the genitive plural; as such, the collocation makes no sense without an additional, quantitative element: *pivo po tolarja* 'beer for tolar' instead of *pivo po 300 tolarjev* 'beer for 300 tolars'

**klop** 'bench' or 'tick' – a homonym that has not been disambiguated in the dictionary

Do you find anything about the entry distracting? Did you identify the word as a homonym (words having the same spelling but different meanings)? Do you find the ambiguity distracting? Are you distracted by proper nouns as collocates? Do you find that there are too many errors?

**usesti (se)** 'to sit (oneself) down' – an inherently reflexive verb which is missing the obligatory *se* pronoun in the dictionary

*[The participant first enters the word into the search window; the interviewer observes their reaction and then continues with the questions.]*

Did you notice the absence of the *se* pronoun? (or Does the lack of reflexivity (*usesti se*) bother you? Do you find that there are too many errors?)

### Third segment: General dictionary features

#### Automatic compilation

*[The questions are meaningfully incorporated into the discussion about specific headwords.]*

In its initial stage, this resource is compiled completely automatically. This is why, as you may have noticed, it also includes information that should not be here. Do you feel there is too much noise or that there are too many errors? Do you find this distracting? Why (not)?

This resource enables dictionary entry tracking and provides information on the phase of entry completeness, generated by clicking on the pyramid icon. Did you notice this? How do you find this?

This resource was compiled automatically and as such was made freely and openly accessible as soon as it was compiled. Do you prefer free and open resources with raw data or payable sources with clean data?

This new form of language resource allows for continuous upgrades and updates; the development team can include new collocations and headwords, the users can vote on collocation candidates, etc. Do you prefer static, unchangeable resources, or are there any advantages to a dictionary that can change over time?

Changes also mean that the dictionary is never fully complete and is continuously developing. How do you feel about that?

### **User inclusion**

*[Questions are meaningfully incorporated into the discussion about specific headwords.]*

Did you notice it was possible to contribute to the dictionary as a user (i.e. up- or downvote collocates/collocations)?

Do you find user involvement positive or negative?

Once the user up- or downvotes a collocation, their rating immediately appears on the page. How do you feel about this?

Do you find the resource stimulating enough to contribute to it yourself? Would you provide your votes in the dictionary? Why (not)?

What would motivate you to contribute to the compilation of the dictionary? What would additionally motivate you to do so?

Do you have any reservations about user inclusion? *[The participant is given the space to respond first; they are then asked to discuss whether they see user inclusion as shifting the burden of responsibility onto the users by means of crowdsourcing; whether this constitutes taking advantage of the user; whether they are concerned about the potential lack of experience or professionalism in users; whether user judgement may in fact improve the quality of the dictionary, etc.]*

### **Digital-only form**

This resource has no printed version. Is that a problem or do you find its digital-only form an advantage?

**Interface**

Interface problems

*[The interviewer asks specific questions]*

Do you find the dictionary useful? What do you like most about it?

What are the main reasons you wouldn't use this dictionary?