A Corpus-based Dictionary of Polish Sign Language (PJM)

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Abstract

The aim of this paper is to give a general overview of an on-going lexicographic project devoted to Polish Sign Language (PJM), a natural language used by the Deaf community in Poland. The project in question will result in the first-ever PJM dictionary based on extensive corpus data (encompassing more than 300 hours of video material recently collected by the Section for Sign Linguistics of the University of Warsaw). The present article discusses the most important assumptions and methodological foundations of the current PJM dictionary project and confronts them with previous work on PJM and Signed Polish glossaries, as well as with international standards in contemporary sign language lexicography. The design of the new PJM dictionary is discussed in detail, including the most problematic issues, such as lemmatization, sense division and sense description principles. Sample entries are given as illustration. It is important to note that apart from filling an important gap in the availability of sign language teaching and learning materials in Poland, the PJM dictionary outlined in this paper is also likely to further the recognition of PJM as a full-fledged natural language.

Keywords: Polish Sign Language (PJM); corpus-based dictionary; sign language lexicography

1   Introduction

Polish Sign Language (*polski język migowy*, usually abbreviated as PJM) is a natural visual-spatial language used by the Deaf community in Poland. It emerged around 1817, with the foundation of the first school for the deaf in Warsaw, and has been continually in use since then. The current number of PJM users is estimated to exceed 50,000. Despite being one of the largest minority languages in Poland, PJM has not – until recently – attracted much attention from the hearing linguistic community. The first-ever academic unit specializing in research on the grammatical and lexical properties of PJM was created at the University of Warsaw in 2010 (the Section for Sign Linguistics, SSL). The present paper is devoted to a large-scale research project that is currently being developed by the SSL team with the aim of creating a corpus-based dictionary of PJM.

2   Previous PJM lexicography

As happened with most sign languages worldwide (Zwitserlood 2010 and the references therein), early dictionaries of PJM were relatively simple glossaries or wordlists. The first one, published in 1879 and reprinted as Hollak et al. 2011, featured spoken Polish words as headwords, while the body of the entry featured descriptions of how the sign was actually produced or, if the sign language equivalent of a Polish word consisted of a combination of signs, the component signs (described elsewhere in the dictionary) were listed. Thus the entries read as follows (translation ours): "ALLOW – move the hands down in front of oneself and nod seriously"; "WIT – the sign *quick thinking* followed by the sign *wisdom*" (Hollak *et al.* 2011). The dictionary was designed for families of deaf people and for educators. Despite its simplicity, it is a very important source of knowledge on the history of the PJM lexicon.

Again, as in most countries, sign language was banned from Deaf education in Poland for most of the 20th century. The departure from strict oralism in Deaf education and the reintroduction of signs was followed by the creation and establishment of a hybrid artificial code, called the Language-Sign System (*system językowo-migowy*, usually abbreviated as SJM), to be used in Deaf schools as the official language of instruction. SJM was a combination of a set of PJM signs, other artificially created signs and Polish grammar, and is, therefore, often referred to as Signed Polish. Importantly, natural sign language signs were supplemented with signs created as word-formation calques from Polish; the syntax was that of spoken Polish, and in its most elaborate form, it involved finger-spelled Polish morphological affixes.

At that time another dictionary, or rather glossary, was published (Hendzel 1986/2006), in which signs were represented by black-and-white photos of people producing them, with arrows representing movement. The Polish wordlist was based on Bartnicka & Sinielnikoff's (1978) learner's dictionary of Polish. For each sign, spoken Polish equivalents were added, e.g. for a sign referring to friendship the equivalents are Polish lexemes meaning 'friendship', 'friendly', 'friendlily' 'to be friends', 'male friend', 'female friend'. The dictionary presents both true PJM signs and signs that are used in SJM exclusively (cf. Ruta & Wrześniewska-Pietrzak 2013).

The latest general lexicographical publication (Kosiba & Grenda 2011) follows roughly the same principle, though the pictures are in color. Both Hendzel (1986) and Kosiba & Grenda (2011) contain over 2000 signs. Both publications arrange their entries by alphabetical order of Polish words. In the latter publication the headword list was compiled on the basis of various sources, including specific purpose glossaries and phrasebooks, based on both SJM (e.g. Szczepankowski 2000) and PJM (Grzesiak 2008, 2010a,b,c).

In general, for all the lexicographic work mentioned above (Grzesiak's phrasebooks being a notable exception), the lexicographic procedure for eliciting appropriate signs was based on Polish language lexemes, with all the possible dangers and actual errors this procedure may entail (Zwitserlood 2010: 455).

3 Sign language lexicography world-wide

In the meantime, sign language lexicography world-wide has taken a radical turn from glossaries to descriptive or explanatory dictionaries. The explanatory character of such dictionaries has consisted in the meaning of each sign being given not as a spoken language equivalent, but as a sense definition. As such, entries in sign language dictionaries started to conceptually resemble those of monolingual dictionaries of spoken language, though in contrast to true monolingual dictionaries the lexicographic description was not provided in the same language as the headword: thus in the American Sign Language Dictionary (Costello 1998) the sign referring to 'bear' (animal) is identified as a noun and provided with an English definition "[...] a large, heavy mammal with thick, rough fur [...]" (Zwitserlood 2010: 447). This model was also adopted for the Auslan dictionary (Johnston 1989), where the English-language definitions were adopted from the Collins-Cobuild dictionary (Johnston, p.c.). Thus the two explanatory dictionaries were not in fact truly monolingual; a true monolingual sign language dictionary should have the definitions signed (Johnston, p.c.). Yet there is no actual dictionary of a sign language that uses the sign language as the lexicographic metalanguage (Kristoffersen & Troelsgard 2012, Zwitserlood, Kristoffersen & Troelsgard 2013). Both ASL and Auslan dictionaries were originally published as books, with signs represented by drawings. In both publications the headsigns (or lemmas) were ordered not by alphabetical order of English-language equivalents, but by formal features of signs: handshape, hand orientation, sign location, direction of movement (for more detailed discussion of sign representation systems both in printed and on-line dictionaries see Zwitserlood 2010; Kristoffersen & Troelsgard 2010, 2012; Zwitserlood, Kristoffersen & Troelsgard 2013). Nowadays, sign language dictionaries are generally fully electronic, with videos representing headsigns and even sign language examples, as can be seen for instance in the Danish Sign Language Dictionary and Finnish Sign Language Dictionary. Moreover, signs can be accessed not only by formal features but also by topics, and the dictionaries can be used as thesauri as well.

4 Research into PJM – grammar and dictionary

The changes in sign language lexicography are part of a general advance in sign linguistics, brought about by modern video and IT technology that allowed for compilation and analysis of sign language corpora (Crasborn *et al* 2008). A sign language corpus is also being compiled in Poland. The PJM corpus project was launched in 2010 and its first phase will conclude in 2014. The underlying idea is to compile a collection of video clips showing Deaf people (native signers) using PJM in a variety of different contexts. As of early 2014, more than 80 people have already been filmed. When the project is completed, approximately 300 hours of footage will be available for research purposes. The PJM corpus is diversified geographically, covering more than 10 Polish cities with significant Deaf populations. The

group of signers participating in the project is well balanced in terms of age, gender, as well as for social and educational background (respective sociological metadata is an integral part of the corpus).

Recording sessions always involve two signers and a Deaf moderator. The procedure of data collection is based on an extensive list of tasks to be performed by the two informants. Typically, the signers are asked to react to certain visual stimuli, e.g. by describing a scene, naming an object, (re-)telling a story, or explaining something to their partner.

The elicitation materials include pictures, videos, graphs, comic strips, etc., with as little reference to written Polish as possible. The participants are also requested to discuss a number of topics pertaining to the Deaf. Additionally, they are given some time for free conversation (they are aware of being filmed but no specific task is assigned to them). The latter two parts of the recording session scenario are aimed at collecting spontaneous and naturalistic data.

The raw material obtained in the recording sessions is further tokenized, lemmatized, annotated, glossed and translated using the iLex software developed at the University of Hamburg (Hanke & Storz 2008). The annotation conventions employed have been designed especially for the purposes of PJM (cf. Rutkowski, Łozińska, Filipczak, Łacheta & Mostowski 2014).

The two basic outcomes of the project are the compilation of a PJM dictionary and a grammar of PJM. The two have to be compatible in terms of underlying theoretical assumptions about sign language linguistics; moreover, it has been decided that the lexicography part of the project has to suit the grammatical description and not vice versa.

The methodology used to produce the PJM dictionary is based on methodologies established for compiling corpus-based spoken language dictionaries. The lexicographers working on the project are native signers, either hearing bilinguals (children of Deaf parents) or Deaf signers with near-native fluency in spoken/written Polish, all of them trained in monolingual lexicography. Thanks to iLex, they have access to all tokens (occurrences) of a particular sign and on the basis of this usage data they establish the meaning of each sign. It is a challenging procedure that needs to take into account various issues such as homonymy versus polysemy, division into syntactic categories, sense division, and adequate sense description, described below.

5 The design of the PJM dictionary

5.1 Target audience and general purpose

Whenever any dictionary is compiled, whether of sign or spoken language, the basic question that has to be addressed is what kind of purpose it is meant to serve and, in consequence, what kind of user group it is aimed at. In terms of purpose, dictionaries can be divided into two types: descriptive or explanatory, i.e. monolingual and bilingual. Importantly, in lexicographic tradition it is the expla-

natory dictionaries that have always been kept in higher regard: having an explanatory dictionary devoted to it gives a language stature and recognition. This socio-cultural and sociolinguistic aspect of lexicography has lead us to design our dictionary as primarily explanatory. However, since it is not the Polish Deaf community that needs to be made to recognize PJM as a separate language of a linguistic minority, but the general society, compiling a truly monolingual explanatory dictionary of PJM would not only be technically and methodologically feasible, but also would defeat the very purpose of giving PJM its due recognition. That is why we opted for a hybrid explanatory dictionary, i.e. one in which the lexicographic description is given in spoken Polish, as was done in the ASL and Auslan dictionaries mentioned above. In spite of Zwitserlood's (2010: 463-464) criticism of the apparently similar procedure adopted by the publishers of the Dutch Sign Language dictionary (Schermer & Koolhof 2009), we believe that it offers several important advantages.

First of all, the meanings of signs are explicitly described and not left to be inferred from a set of Polish equivalents, which would have been the case had we followed the bilingual-like model that has recently gained popularity in sign language lexicography. There is a general risk of wrong inferences being drawn about the meaning of the source language item from the translation equivalents (Linde-Usiekniewicz & Olko 2006) if semantic equivalents are interpreted as translation equivalents or vice-versa (see Piotrowski 1989 for the distinction, and Piotrowski 1994: 104-155 for more detailed discussion of equivalence in general). While in the Danish dictionary this risk is minimized by linking Danish equivalents to their corresponding entries in a general Danish explanatory dictionary (Kristoffersen, p.c.), this option was not available to us.

Explicit semantic description of sign meanings makes the dictionary a useful source for research into the PJM lexicon and PJM semantics, independently of the researchers' actual proficiency in PJM. It is also a valuable source material for hearing people (native speakers of spoken Polish) learning PJM.

Paradoxically, while the design of the dictionary is such that it gives grounds for the sociolinguistic recognition of PJM, it might appear as if it were of less practical value to the Deaf community. Yet this is not the case. The majority of Polish Deaf are in fact bilingual and use spoken Polish (through lip-reading for speech and in written form). For more technical and academic texts they use Polish language dictionaries, which, in their great majority, are meant for native Polish users. Thus the PJM dictionary in its present form is a kind of a bridge dictionary (Williams 2008), which offers training in the way word senses are being defined in Polish lexicography. Yet since the original bridge dictionaries of English have English lemmas and English Collins-Cobuild definitions translated into the native language of the learners, the PJM dictionary, seen in that light, is actually the reverse combination: sign language lemmas and Polish definitions.

5.2   Directionality and looking-up options

The dictionary is conceived in principle as unidirectional, with sign language signs as lemmas. Nevertheless, when appropriate, for each defined sense, a Polish equivalent or equivalents are provided, and all equivalents are listed alphabetically, so the reverse direction is also available. If several entries share the same Polish equivalent, it is cross-referred to all of them. In the reverse looking-up mode, the definitions provide cues to the appropriate sense of a polysemous or even homonymous Polish word.

PJM signs can be identified by the aforementioned features of handshape, orientation, location and movement, as it is done in all sign language dictionaries.

5.3   Lemmatization: homonymy vs. polysemy

There are two ways in which lemmatization can be carried out in sign lexicography (and in spoken language lexicography as well): purely on formal grounds and on the basis of a combination of both formal and semantic criteria. For reasons of convenience, we opted for purely formal criteria, with no homonymous entries, i.e. with homonyms described in a single entry. Nevertheless, at the entry level homonymy-like phenomena are differentiated from polysemy. In some cases the homonymy is obvious, as the attested meanings fall into discrete bundles of related senses. For example there is a sign that may refer to an ache, pain and related phenomena, as well as to the function of director, directorship, etc. However, since there is a strong tendency for iconicity to be the motivating factor for a sign's signifier, a less obvious example consists of a single sign referring to a crown, and by the same token to a monarch, ruling, etc., as well as to someone having a spherical object on their head (Figure 1). It could be argued that the two groups of senses share the same etymology or motivation so no homonymy is involved, yet on the other hand the semantic relation is nothing but tenuous. In the case of homonymy-like phenomena the entry is split into several sections devoted to macrosenses, i.e. bundles of related senses, as shown in Figure 1. The decision as to whether a given entry should be split or not lies with the lexicographers, who nevertheless often consult other native signers to verify their intuitions about relevant groups of senses being interconnected or not.

5.4   Syntactic issues

Another challenge lies in classifying senses and usage-types as belonging to a syntactic category. Sign languages, including PJM, have almost no inflection and parts of speech (POS) cannot be established on morphological grounds. Syntactic criteria are not functional enough, as research into PJM to date has tended to show that the same sequence of signs can be interpreted as corresponding to a complex nominalization or to a full clause. Moreover, in contrast to spoken languages for which there are established grammars, the grammar of PJM is being investigated in parallel, on the basis of the same cor-

pus. However, identifying the syntactic character of a sign is necessary in order to provide the most adequate semantic definition of a given sense in Polish. At the same time, the way a given definition is formulated in Polish, i.e. using Polish verbs, nouns or adjectives as key elements, could erroneously suggest the POS of the sign being defined: using infinitives in definitions suggests a uniquely verbal character, using nouns suggests a nominal character, etc. In order to match senses with definitions we decided to eschew POS identification for signs and provide usage-type information instead. The usage-type information reflects the syntactic category identified on a semantic basis (Wierzbicka 2000; Schwager & Zeshan 2008).

Thus the syntactic properties of a sign are introduced in the dictionary as different types of usage (see Figure 1 and 2). The main usage types are named with terms based on the traditional Polish POS system. More importantly, irrespectively of their correspondence or non-correspondence to Polish POS, they are seen as falling into two largely distinct groups: one corresponding to words with predominantly conceptual meaning and the other corresponding to words with predominantly procedural meaning (Wilson 2011). Signs belonging to the first group are described as having: verb-like usage (i.e. referring to an act, an activity, a process or an event or a situation); noun-like usage (i.e. denoting a person, an animal or an object); adjective-like usage (i.e. denoting an entity's feature or property); adverb-like usage (i.e. denoting a feature of an activity or a process); and numeral-like usage, corresponding to cardinal and ordinal numerals. The second group contains pronoun-like usage, preposition-like usage and conjunction-like usage.

Not all signs and sign senses of PJM have a corresponding POS in spoken Polish. Sign languages are known for classifier signs (Zwitserlood 2012) both of nominal and verbal character. While nominal classifier signs mainly serve to identify referents, verbal classifiers usually involve incorporating both the path of movement or direction (if applicable) and the shape of the object the sign refers to. One example of such a classifier sign was the macrosense 'having a spherical object on one's head', the second macrosense of the sign also associated with king, reign and crown (see below).

5.5   Sense division and sense description

For all the senses associated with conceptual meaning the appropriate definition is not presented as semantic equivalence, as has been done in Costello (1998) and in Johnston (1989), but as a description of the sign denotation or reference. Thus, the appropriate entry fragment for the 'crown/king/rule...' sign is presented in Figure 1:

[MACROSENSE] **I**. *REIGN*.
    [SYNTACTIC CATEGORY] **A**. *in nominal usage*:
        [MICROSENSE] **1**. denotes a person, usually of noble blood, who rules a country
        [MICROSENSE] **2**. denotes a headgear, usually made of precious metal and precious stones, that a ruler wears for ceremonial purposes.
    [SYNTACTIC CATEGORY] **B**. *in verbal usage*:
        [MICROSENSE] refers to a situation in which a person, usually of noble blood, rules a country
[MACROSENSE] **II.** *CLASSIFIER*
    [SYNTACTIC CATEGORY] **A**. *in verbal usage*:
        [MICROSENSE] refers to a situation in which somebody wears or carries something on their head

Figure 1: The entry for king/crown/rule (translated into English).

By contrast, signs with procedural meaning (or procedural senses of a given sign) are described in terms of their function; thus the sign corresponding to the conjunction 'or' is described as shown in Figure 2:

[SYNTACTIC CATEGORY] *used as conjunction*
    [MICROSENSE] **1**. is used to connect two expressions or sentences, at least one of which is true
    [MICROSENSE] **2**. is used to connect two expressions referring to two possibilities, from which a choice needs to be made.

Figure 2: The entry for conjunction 'or' (translated into English).

The sense definitions tend to be highly detailed, and at the same time, formulated in a simple language, following the spirit, but not the letter of the Collins-Cobuild project (Sinclair 1987, and particularly Hanks 1987), and its Polish counterpart, Bańko 2000. To underline the fact that the dictionary definitions describe signs and do not provide complete semantic equivalents, the definitions are formulated in terms of specific frames, already mentioned above: thus, signs in noun-like usage *denote* entities further specified in the definition; signs in adjective-like usage *describe* entities as having some property further specified in the definition and signs in verb-like usage *refer* to a situation further described in the definition. For verb-like usages the definition contextually specifies the "subject-like" and the "object-like" syntactic arguments. Directional verbs are specified as such in the syntactic category.

Sense definitions tend to be extended and comprehensive, as we are trying not to use examples either to further specify the range of meaning or to supplement an over-general definition, but to illustrate the sign use. Specifically we will be using examples to show nouns used as modifiers, or being modified by other nouns, since this is a syntactic property of sign languages, including PJM, that is absent in Polish. Adjectives will be illustrated either by attributive or predicative use, and specifically to show if they tend to be used pre- or post-nominally (Rutkowski, Łozińska, Łacheta & Czajkowska-Kisil 2013, Rutkowski, Czajkowska-Kisil, Łacheta & Kuder 2013).

In order to arrive at the actual sense division for each sign the lexicographer consults the recorded corpus, using the iLex software (Hanke & Storz 2008). Since many tokens of the same sign are repeated in recordings of different participants performing the same task (questionnaires, recounting pictures and movies) the lexicographers are not required to check all instances of use in the same context. (This is one of the advantages of working with an elicited corpus, as opposed to spoken language corpora, where corpus search brings numerous repeated instances of the word's use). However, the lexicographers are supposed to check all the instances in which the sign appears in free discourse. Since the lexicographers are themselves native signers with fully developed vocabulary (teachers of PJM and PJM interpreters) they may apply their own knowledge of the sign, confirmed by other deaf consultants, to further develop the entry, thus providing senses not attested in the corpus. On the basis of both corpus-attested usage and not corpus-attested but nevertheless confirmed usage, they establish sense division. In so doing, they are not supposed to be guided by Polish equivalents of the sign. Thus, having a single Polish equivalent does not constitute evidence for a sign having a single sense. On the other hand, having two different translation equivalents in Polish does not constitute evidence for there being two different senses, as is also the case for two spoken languages as represented in bilingual dictionaries (Bogusławski 1995, Linde-Usiekniewicz & Olko 2006, Linde-Usiekniewicz 2011, Lew 2013). The general tendency is for "lumping" as opposed to splitting, i.e. establishing senses conceptually and not by reference or denotation.

6   Video materials

Video clips for lemmas will be recorded in order to provide non-native users with a neat example of the sign production. Variant realizations, usually differing from the basic form by one parameter alone, will also be recorded. Within the body of the entry, some examples of actual use will be provided as clips. These would be chosen from corpus recordings to complement the information explicitly provided in the entry. For example signs with nominal usage and sense defined in the entry will be illustrated in their attributive use (i.e. where they would be translated into Polish as adjectives); ordinary verbs will be exemplified by their use with standard arguments and also in patterns where they would be translated by nominalizations. Examples will also be provided for directional verbs and for classifiers. Though the examples will be initially chosen from the corpus material they will be reproduced and re-recorded in controlled conditions, for greater clarity. Examples will be glossed and accompanied by Polish translations.

7   Other features

The entries will also feature information about geographical restrictions in sign use (if applicable), since some of the signs tend to be used only in some geographically restricted areas (i.e. they are regionalisms). Another feature, meant mainly for non-native signers, is that of cross-reference and comparison. The 'compare' feature will direct the user either to a sign that is produced in a similar way, and therefore may be confused, or to a sign that differs in form but has the same Polish equivalent.

8   Size and coverage

As to the dictionary size, in order to be as comprehensive as possible we plan to include all signs which are represented by more than 5 tokens in the corpus. However, the headsign list will have to be complemented by signs taken from other sources, since the corpus frequency is influenced by the nature of the corpus: it is an elicited corpus, based largely on specific visual stimuli, with signs corresponding to these stimuli largely overrepresented.

9   Concluding remarks

Overall, the main objective of the PJM dictionary project described here is to fill an important gap in the availability of sign language teaching and learning materials in Poland, by providing a dictionary of groundbreaking functionality. Moreover, it is our expectation that the resulting dictionary is likely to further the recognition of PJM as a full-fledged natural language. As such, we have offered some justification herein for the methodological assumptions and choices made in developing this project, as being appropriate for this particular set of circumstances.

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