

The Effect of Defining Model on the Accuracy of Syntactic Class Identification in *When*-Definitions in Digital Dictionaries

Bartosz Ptasznik ^a

bartosz.ptasznik@uwm.edu.pl

Faculty of Humanities

University of Warmia and Mazury in Olsztyn, Poland

Robert Lew ^b

rlaw@amu.edu.pl

Faculty of English

Adam Mickiewicz University in Poznań, Poland

ABSTRACT

The aim of the present contribution is to identify the best variant of the single-clause *when*-definition in online monolingual English dictionary entries. The study uses manipulated online dictionary entries and a balanced experimental design on a large sample of advanced learners of English to assess the success of syntactic class identification in three sub-types of the single-clause *when*-definition. Syntactic class identification was measured by examining the syntactic class of the Polish translations of the target headwords supplied by participants in the experimental task. Significant differences are found between all three defining models, with the most effective being a model using the personal pronoun (you), the least effective being definitions using the indefinite pronoun (someone), and a defining model using a noun phrase (a person) resulting in intermediate scores. The article concludes with practical recommendations for digital lexicography for learners of English that follow from our findings.

Keywords: English; ESL; EFL; EAL; online dictionary; learner's dictionary; definition; syntactic information

INTRODUCTION

Amongst language tools assisting language learners, dictionaries have always held a special place. More recently, dictionaries have gradually but irrevocably moved to the digital format (Lew & de Schryver, 2014), and in this modern format, they remained among the most sought-after resources (Levy & Steel, 2015; Tsai, 2019). A relevant consequence of the transition to the digital medium has been the relaxation of space constraints, which have shaped editorial policies in traditional print-medium dictionaries, including defining models (Rundell, 2015, p. 303). Innovation driven by the transition to the digital medium seems to have been spearheaded by the British tradition of learner lexicography. This influential tradition — no doubt driven by the special status of English as an international and widely-learned language — has shaped pedagogical lexicography

^a Main author

^b Corresponding author

worldwide. It has also produced an impressive range of dictionaries designed specifically for learners of English.

The definition is the most central entry element in monolingual dictionaries for learners. Initially, the definition in learner dictionaries followed the general lexicographic practice, which goes all the way back to Aristotle, embracing the classical *analytical* defining format. In its most canonical formula, this format consists of a part that specifies the *genus*, that is a general class of things which the word being defined represents, and a *differentia specifica*, which gives the distinguishing features that make the definiendum stand out from other members of the general class. For example, an analytical definition of **agoraphobia** might sound something like ‘fear of open spaces’. In this definition, *fear* is the *genus*, indicating that agoraphobia is a type of fear. The remainder of this definition is the *differentia specifica*, restricting the type of fear that is meant to the kind that comes from being in open spaces. Please note that the *genus* word *fear* is a noun, just like the word *agoraphobia* being defined: this congruence between the syntactic class of the headword and a pivotal word in its definition will be important in what follows.

English learner lexicography has been marked by innovation: rather slow and gradual (not the least because many dictionary users do not appreciate change), but at times significant. Among the aspects that have undergone innovation has been the definition. The Vocabulary Control Movement initiated in the 1930’s (Cowie, 1999, pp. 14–25) inspired the introduction of restricted defining vocabularies in a number of dictionaries in the late decades of the century. Behind this effort is the belief that the words used in a dictionary definition should be at least as simple as the word being defined. The otherwise groundbreaking COBUILD project (Sinclair, 1987b, 1987a) introduced a rather radically different formula for the definition, known in the literature as the *contextual definition* or *Full-Sentence Definition* (also: *FSD*). This formula came from the assumption that usage patterns and meaning are inextricably related. Therefore, to do justice to this assumption, a typical COBUILD-style definition has two clauses: the first one introduces a usage pattern, and the second paraphrases its meaning. Using our example of **agoraphobia**, a definition that does this might run as follows: ‘if you have agoraphobia or suffer from agoraphobia, you are afraid to be in open spaces’. In this case, our definition covers two common patterns that include verbs collocating with *agoraphobia*.

Finally, a somewhat similar but simpler format which entered English learner lexicography in the early 2000’s, specifically in the 4th edition of the *Longman Dictionary of Contemporary English* (Summers, 2003) and the second edition of the *Cambridge Advanced Learners’ Dictionary* (Walter, 2005). The format, known as the single-clause *when*-definition (Lew & Dziemianko, 2006a), consists of, essentially, the latter clause of the COBUILD-style definition, introduced by a *wh*-word, most typically *when*, but occasionally by another word such as *why* or *how*. Thus, a single-clause *when*-definition of **agoraphobia** might sound as follows: ‘when you are afraid to be in open spaces’. This defining format had been rare in modern dictionaries, although there is evidence of its use as early as the 17th century, notably in Elisha Coles’s *English Dictionary* (Osselton, 2007).

The assumption of the link between pattern and meaning appears to be a sensible one, and its importance has grown with the increasing use of corpus evidence (Hanks, 2013). As we have seen, the FSD has included a pattern of use in the definition, while other dictionaries for learners of English have chosen to give this information outside the definition, such as in a special pattern code (for a detailed overview, see Dziemianko, 2012). A traditional approach has used a part-of-speech label, such as *N*, *Noun*, *V*, *Verb*, or *vt* (for *transitive verb*). Be it code or label, studies have shown that many dictionary users tend to ignore the less central entry elements to the exclusion of

the definition. Therefore, it might be a good idea to include information on use, and not just meaning, in the definition. We have seen that COBUILD has made it a priority. In an analytical definition, the part of speech of the *genus* part should match that of the headword: this is the so-called principle of substitutability, considered a traditional tenet of lexicography. However, the *when*-definition does not seem to obey this principle: it has the general form of a *wh*-clause, but — in modern learner lexicography — has been used to define abstract nouns. One motivation for resorting to this format when defining abstract nouns was that there may be no useful *genus* word to use for such words (Walter, personal communication). In the next section, we will present an overview of previous research into the single-clause *when*-definition, with a particular focus on its (in)ability to convey the syntactic class of the headword.

PREVIOUS RESEARCH INTO THE *WHEN*-DEFINITION

Dictionaries should be as useful to their users as possible, and the user perspective has motivated experimental user research testing empirically the efficacy of different lexicographic solutions, particularly in monolingual dictionaries for learners of English (cf. Dziemianko, 2017, 2019, 2022; Frankenberg-Garcia, 2014).

One direction of dictionary user research relevant in the present context involves investigating the effectiveness of the single-clause *when*-defining format. Interest in this format seemed to take off with a series of papers in 2006 (Dziemianko & Lew, 2006; Lew & Dziemianko, 2006b, 2006a). This line of research followed the introduction in some learners' dictionaries of the *when*-definition as a way to define abstract nouns, such as in this definition of *obstruction* in LDOCE4: 'when someone or something prevents or delays a legal or political process'. The authors noted that the vague clause format of this defining model might not serve users well in terms of conveying part-of-speech information in abstract noun entries. These early studies suggested that this concern might indeed be justified. Further studies confirmed these initial findings (Dziemianko & Lew, 2013; Fabiszewski-Jaworski & Grochocka, 2010). Specifically, Fabiszewski-Jaworski and Grochocka (2010) found that analytical definitions conveyed part-of-speech information for abstract nouns more effectively than *when*-definitions. The reader will find a detailed discussion of this line of research in Ptasznik (2021), whereas here let it suffice to summarise the main results in **Table 1**.

TABLE 1. An overview of empirical studies into the single-clause *when*-definition (partially based on Ptasznik, 2021)

Study	Main findings
Lew and Dziemianko (2006a)	Part-of-speech identification task: analytical definitions (66.7%); <i>when</i> -definitions (33.2%); statistically significant difference. Sentence formation task: analytical definitions (53.6%); <i>when</i> -definitions (26.6%); statistically significant difference.
Dziemianko and Lew (2006b)	Part-of-speech identification task: analytical definitions (86.1%); <i>when</i> -definitions (85.4%); statistically nonsignificant difference.
Dziemianko and Lew (2013)	Part-of-speech identification task: analytical definitions (90.1%); <i>when</i> -definitions (87.0%); statistically significant difference.
Fabiszewski-Jaworski and Grochocka (2010)	Part-of-speech identification task: analytical definitions (33.3%); <i>when</i> -definitions (26.2%); statistically significant difference.
Ptasznik (2021)	Part-of-speech identification task: <i>when</i> + <i>personal pronoun</i> (82.1%); <i>when</i> + <i>indefinite pronoun</i> (78.9%); statistically significant difference.

In the most recent study on the topic, Ptasznik (2021) followed up on a rather tentative observation in Dziemianko and Lew (2013) that identifying part of speech from *when*-definition might be affected by the wording of the referring pronoun. He designed a controlled study to specifically compare two *when*-defining models, differing in the choice of subject of the *when*-clause: *when + personal pronoun* (for example, ‘when you are afraid of open spaces’) versus *when + indefinite pronoun* (‘when somebody is afraid of open spaces’). Ptasznik’s main conclusion was that the *when + personal pronoun* defining strategy appeared to be marginally more beneficial for upper-intermediate and advanced-level learners of English than the *when + indefinite pronoun* defining format when information about the word class of a word is derived from abstract noun entries. The *personal pronoun (you)* defining model corresponded to a syntactic identification accuracy of 82 percent, compared to 79 percent in the *indefinite pronoun (someone/something)* defining model. Given the fact that single-clause *when*-definitions fail to comply with the well-established substitutability principle (one that analytical definitions inherently adhere to) in defining, all studies stressed that more attention must be given to the *when*-defining style, and that lexicographers of monolingual learners’ dictionaries should exercise caution and restraint in including this defining style in dictionary entries. Nevertheless, given the advantages of this format — namely, its relative brevity compared to COBUILD definitions and friendly, conversational style — it would probably be too harsh to ban this format altogether. Instead, in what follows, we try to identify the variant of the *when*-definition that performs best in terms of conveying syntactic class information. Previous studies suggest this might be the variant using the personal pronoun *you*, rather than the indefinite pronoun *someone*. In this study, we test these variants on a larger sample of participants but add one more defining model that uses a noun phrase (*a person*).

STUDY

AIM

The aim of the present study is to identify the best variant of the single-clause *when*-definition in digital monolingual English dictionary entries. To accomplish this, we examined the effectiveness of the different types of single-clause *when*-defining models (*when + personal pronoun*, *when + noun phrase* and *when + indefinite pronoun*) in English monolingual pedagogical dictionaries on syntactic class identification accuracy for abstract nouns. The following three detailed research questions were posed:

- (1) Does the *when + personal pronoun* defining pattern contribute to higher syntactic class identification accuracy for abstract nominal headwords than the *when + indefinite pronoun* defining pattern?
- (2) Does the *when + noun phrase* defining pattern contribute to higher syntactic class identification accuracy for abstract nominal headwords than the *when + indefinite pronoun* defining pattern?
- (3) Does the *when + personal pronoun* defining pattern contribute to higher syntactic class identification accuracy for abstract nominal headwords than the *when + noun phrase* defining pattern?

PARTICIPANTS

A sample of 237 participants was recruited for the study. They were university students (males and females, aged 19–24) majoring in English at the University of Warmia and Mazury in Olsztyn, Poland. Polish was their native language. Their language ability (English) was assessed as B2-C1 according to the CEFR scale. All of the subjects had to give their consent to participate in the study.

DESIGN

In the present investigation, we take the topic of single-clause *when*-definitions a stage further and incorporate three *when*-defining models (*when* + *indefinite pronoun/personal pronoun/noun phrase*) into the experimental design to test the efficacy of *when*-definitions on syntactic class identification accuracy for abstract nominal headwords. Thirty-six test items were selected for the study: 18 nouns, 9 verbs, and 9 adjectives. The verbs and adjectives were used as distractors (given the aim of the study, responses for verbs and adjectives were not collected), in an attempt to make the target items (nouns) less salient. More sophisticated items were included in the experimental design to make the task more challenging. The verbs and adjectives were hand-picked from words outside the *Longman Communication 9000*. As far as nouns are concerned, their selection was determined by the specific defining format assigned to nominal headwords in the *Longman Dictionary of Contemporary English (LDOCE online)*, as only noun entries occurring with single-clause *when*-definitions were taken into account. Considering that the participants' proficiency levels ranged from upper-intermediate to advanced, there was some risk that they might use the morphological structure of the headwords to infer their part-of-speech. Therefore, we replaced the actual target nouns in the test with non-existent pseudo-words, whereas the verb and adjective distractors were not so replaced. Following Ptasznik (2021), the pseudo-words were produced with the assistance of WordGen (Duyck et al., 2004), which is a nonword-generating program. To assign random locations to the test items across different test versions, we used the Random Integer Set Generator (<https://www.random.org/integer-sets/>). Three item orders were produced for three test versions, which allowed to minimize any item order effects. In each single test, eighteen nouns, nine verbs and nine adjectives were used. The verb and adjective entries were used with their respective definitions taken from *LDOCE online*, while noun entries were supplied with appropriate versions of single-clause *when*-definitions. Within each test, the nouns appeared with either the *when* + *personal pronoun*, *when* + *noun phrase* or *when* + *indefinite pronoun* defining model. All three experimental conditions were evenly spread across each test (six nouns were used with the *when* + *personal pronoun* defining model, six nouns were used with the *when* + *noun phrase* defining model, six nouns were used with the *when* + *indefinite pronoun* defining model). A counterbalanced design was adopted, with different experimental conditions assigned to different nouns across test versions. The assignment of nouns to specific *when*-defining models and rotation of the target items by three orders and test versions are presented in **Table 2**, whereas the rotation of adjectives and verbs by three orders is given in **Table 3**. The specific single-clause *when*-definitions used in the study for particular items within the three experimental conditions are collated in **Table 4**.

TABLE 2. Assignment of nouns to *when*-defining models within each test version and rotation of target items by three orders. Columns v1, v2, v3 refer to test version 1, test version 2, test version 3, respectively; and symbols: n, p, i in these columns refer to the *when + noun phrase*, *when + personal pronoun*, and *when + indefinite pronoun* defining models, respectively

order 3	order 2	order 1	target item	pseudo word	v1	v2	v3	POS
15	5	17	provision	rangom	n	p	i	noun
5	9	11	sanity	lucate	n	p	i	noun
28	11	22	uncertainty	patsee	n	p	i	noun
35	4	14	absolution	coaset	n	p	i	noun
29	28	25	forgiveness	rissue	n	p	i	noun
33	10	32	favouritism	deayen	n	p	i	noun
36	33	6	service	magnem	p	i	n	noun
18	17	33	submission	tienon	p	i	n	noun
7	25	27	imitation	recapt	p	i	n	noun
2	12	4	self-denial	defude	p	i	n	noun
8	35	5	disregard	conven	p	i	n	noun
26	29	31	connection	renamp	p	i	n	noun
31	14	20	precedence	privel	i	n	p	noun
25	34	8	agitation	untoll	i	n	p	noun
21	18	24	attention	derunk	i	n	p	noun
34	31	29	compensation	dekide	i	n	p	noun
19	23	30	equation	denile	i	n	p	noun
24	19	19	attachment	wonnet	i	n	p	noun

TABLE 3. Rotation of distractors by three orders

order 3	order 2	order 1	distractor	POS
17	36	36	reverberate	verb
20	16	28	shimmer	verb
13	1	26	wail	verb
6	30	16	wring	verb
12	27	18	snag	verb
3	32	10	cower	verb
4	3	35	prickle	verb
1	2	13	trudge	verb
32	8	23	eavesdrop	verb
16	21	9	baleful	adjective
10	20	7	calamitous	adjective
23	6	15	caustic	adjective
30	7	34	dilatory	adjective
9	22	2	endemic	adjective
22	13	3	mendacious	Adjective
14	15	21	pendulous	Adjective
11	26	12	ruminative	Adjective
27	24	1	garrulous	Adjective

TABLE 4. Single-clause when-definitions for specific items across three experimental conditions

Test item	<i>when + indefinite pronoun</i>	<i>when + personal pronoun</i>	<i>when + noun phrase</i>
Provision	When someone provides something that someone needs now or in the future.	When you provide something that someone needs now or in the future.	When a person provides something that someone needs now or in the future.
Sanity	When someone or something is being reasonable and sensible.	When you are being reasonable and sensible.	When a person is being reasonable and sensible.
Uncertainty	When someone feels doubt about what will happen.	When you feel doubt about what will happen.	When a person feels doubt about what will happen.
Absolution	When someone is formally forgiven by the Christian Church or a priest for the things they have done wrong.	When you are formally forgiven by the Christian Church or a priest for the things you have done wrong.	When a person is formally forgiven by the Christian Church or a priest for the things he has done wrong.
Forgiveness	When someone forgives another person.	When you forgive another person.	When a person forgives another person.
Favouritism	When someone treats one person or group better than others, in an unfair way.	When you treat one person or group better than others, in an unfair way.	When a person treats one person or group better than others, in an unfair way.
service	When someone is given a legal document telling them that they must do something or that something is going to happen.	When you are given a legal document telling you that you must do something or that something is going to happen.	When a person is given a legal document telling him that he must do something or that something is going to happen.
submission	When someone gives or shows something to someone in authority, for them to consider or approve.	When you give or show something to someone in authority, for them to consider or approve.	When a person gives or shows something to someone in authority, for them to consider or approve.
imitation	When someone copies someone else's actions.	When you copy someone else's actions.	When a person copies someone else's actions.
self-denial	When someone does not do or have the things he enjoys, for moral or religious reasons.	When you do not do or have the things you enjoy, for moral or religious reasons.	When a person does not do or have the things he enjoys, for moral or religious reasons.
disregard	When someone ignores something that they should not ignore.	When you ignore something that you should not ignore.	When a person ignores something that he should not ignore.
connection	When someone joins two or more things together or when someone joins something to a larger system or network.	When you join two or more things together or join something to a larger system or network.	When a person joins two or more things together or joins something to a larger system or network.
precedence	When someone is considered to be more important than someone else, or something is considered to be more important than something else.	When you are considered to be more important than someone else, or one thing is considered to be more important than another thing.	When a person is considered to be more important than someone else, or one thing is considered to be more important than another thing.
agitation	When someone is so anxious, nervous, or upset that they cannot think calmly.	When you are so anxious, nervous, or upset that you cannot think calmly.	When a person is so anxious, nervous, or upset that he cannot think calmly.
attention	When someone carefully listens to, looks at, or thinks about someone or something.	When you carefully listen to, look at, or think about someone or something.	When a person carefully listens to, looks at, or thinks about someone or something.
compensation	When someone behaves in a particular way in order to replace something that is missing or to balance the bad effects of something.	When you behave in a particular way in order to replace something that is missing or to balance the bad effects of something.	When a person behaves in a particular way in order to replace something that is missing or to balance the bad effects of something.
equation	When someone considers that two things are similar or connected.	When you consider that two things are similar or connected.	When a person considers that two things are similar or connected.
attachment	When someone fastens or connects one thing to another, or the thing that they use to do this.	When you fasten or connect one thing to another, or the thing that you use to do this.	When a person fastens or connects one thing to another, or the thing that he uses to do this.

Custom entries were created for the nouns, verbs, and adjectives. The entries for all the items were provided with the following lexicographic information: headword, pronunciation information, syntactic class label, grammatical information, usage label, as well as a single definition and example sentence for each of the entries. Since the experiment was conducted in a computer-based environment, the entries were presented in colour, with specific information categories highlighted using the different colours adopted in *LDOCE online* entries. The lexicographic data that were used for the compilation of the entries were extracted from the following lexicographic online resources: *Collins Online Dictionary*, *Oxford Advanced Learner's Dictionary*, *Macmillan Dictionary*, *LDOCE online*, *Cambridge Dictionary*, *Merriam-Webster.com Dictionary*.

PROCEDURE AND SCORING

The experiment was performed in a computer laboratory equipped with twenty-four desktop computers running Microsoft Windows 10 Pro with 21.5-inch monitors. Ten experimental sessions were planned beforehand. During the instruction period, before the start of each session, the experimenter explained that participants would be given thirty-six dictionary entries on their computers to study and translate the headwords from English into Polish. The participants were not made aware of the aim of the study. It was, however, made clear that they would be working with English items and translating them into Polish. All of the students were provided with a Microsoft Word document on the hard drive of their computers in one of three versions varying by item order (see Table 2 above). Each test sheet included thirty-six manipulated dictionary entries with target words as headwords. The participants supplied a Polish translation for each of these headwords. They were instructed to type their responses in the blank spaces following each custom entry, by providing one-word Polish equivalents. The syntactic class of each these supplied equivalents was then examined to see if the target words were correctly identified as nouns. The whole study was overseen by the experimenter. Participants were given 60 minutes to complete the task. To increase motivation, the participants were asked to give all their attention and effort to the task, without the possibility of finishing the task earlier than the scheduled one-hour time period. Moreover, the students were told to try not to leave any blank spaces in the test for any of the English headwords.

The tests were graded individually by the experimenters. Given the aim of the experiment, points were solely awarded for noun entries. An item was marked as correct (a score of 1) if the part of speech of the item (in this case, always a noun) was correctly rendered as a noun in the translation. To be given a point for their answers, participants did not have to provide accurate, word-for-word translations of the target items, as the objective was to test the participants on their ability to extract pertinent lexicographic information from the entries about the word class of the items in question. A score of 0 was assigned to test items translated with a non-noun Polish word.

DATA ANALYSIS

All data were analyzed in the R environment for statistical computing (R Core Team, 2023). In order to assess the effect of the defining model (that is the use of one of: indefinite pronoun, noun phrase, or personal pronoun in the definition), we fit a series of logistic regression models, with the syntactic class identification accuracy score (indicating whether the syntactic class of the headword was correctly rendered) as the binary response variable, defining model as the fixed

predictor with three levels, and item, participant, and version as random components (Baayen et al., 2008; Bates et al., 2015). We followed the two-step model selection procedure outlined in (Zuur et al., 2009), starting (at step 1) with the maximal fixed-effects structure and using backward elimination to remove non-significant effects, and then (step 2) reducing the random effects structure. We arrived at an optimal model with the following structure (as expressed in the popular R regression formula notation):

$$\text{Score} \sim \text{DefType} + (1 \mid \text{Version/Item}) + (1 \mid \text{Subject}),$$

where Score refers to the syntactic class identification accuracy score, DefType refers to the defining model, Subject is the Participant ID that identifies participants uniquely, Item is the test item, and version is one of three randomized-order versions of the syntactic class identification test. Note that Item is explicitly specified as nested within Version. The final selected model is significantly better than the next best model that includes no nesting but Version and Subject as random intercepts. The usual model diagnostics (BIC, AIC, AICc, log likelihood) all pointed to our selected best model. Model assumptions were checked using standard model diagnostics (Zuur et al., 2009). The final model displays a dispersion parameter of 0.85, thus there is no evidence of overdispersion or underdispersion.

RESULTS

A summary of the best model is given in Table 5. Recall that the model includes one fixed effect, the *defining model* used, with three levels. We chose the *indefinite pronoun* defining model as the reference level against which the other defining models are measured. Given the Odds Ratios in Table 5, we see that both the *personal pronoun* defining model (RQ1) and the *noun phrase* defining model (RQ2) correspond to higher predicted accuracy scores, and in both cases these differences are significant (as against the reference level, that is *indefinite pronoun*). As a reminder, the Odds Ratio expresses a ratio between odds (chances) of success. For example, the Odds Ratio of 2.17 for the *personal pronoun* defining model means that the chances of successfully identifying the part of speech of the headword as a noun are about twice higher with the *personal pronoun* definition than with the *indefinite pronoun* definition, serving as the reference level. For the *noun phrase* definition, the Odds Ratio is about 1.5, so somewhat smaller than in the case of the *personal pronoun* definition, but still statistically significant. The Odds Ratio for the reference level (*indefinite pronoun*) is expressed against the chance level of 1:1 (50% chance). The value of 5.35 means that the chances of success are about five times better with the *indefinite pronoun* definition than compared to flipping a coin. By changing the reference level to *noun phrase* and re-fitting the model, we have also established that the estimate for the *personal pronoun* defining model is significantly higher than that for the *noun phrase* defining model ($z = 2.044, p = 0.04 < 0.05$, RQ3).

TABLE 5. Summary of the best model with parameter estimates (as Odds Ratios), their 95% Confidence Intervals, and levels of significance (*p*-level)

Defining model	Odds Ratios	95% CI	<i>p</i> -level
Indefinite pronoun (reference level)	5.35	3.72 – 7.69	<0.001
Noun phrase	1.51	1.08 – 2.11	0.015
Personal pronoun	2.17	1.54 – 3.06	<0.001
Random Effects			
τ00 Subject	0.95		
τ00 Item:Version	0.16		
τ00 Version	0.05		

As is common for a logistic regression model, we presented parameter estimates as Odds Ratios, although, mathematically, the estimates in the model are expressed in terms of log-odds (also known as *logits*). All this may be confusing to readers less versed in logistic models. To make the presentation more reader-friendly, , in **Table 6** and **Figure 1** we present our parameter estimates in terms of probabilities of success. For example, the accuracy of syntactic class identification predicted by the best model for the *noun phrase* definition format is 0.89 (or 89 percent), with its accompanying 95% confidence interval (CI), which conveys estimation uncertainty, ranging from 0.85 (85%) to 0.92 (92%). The same point estimates and confidence intervals are plotted in Figure 1 for a visual summary.

TABLE 6. Predicted syntactic class (POS) accuracies with 95% confidence intervals for the three defining models

Defining model	Predicted POS Accuracy	95% CI
Indefinite pronoun	0.84	[0.79, 0.88]
Noun phrase	0.89	[0.85, 0.92]
Personal pronoun	0.92	[0.89, 0.94]

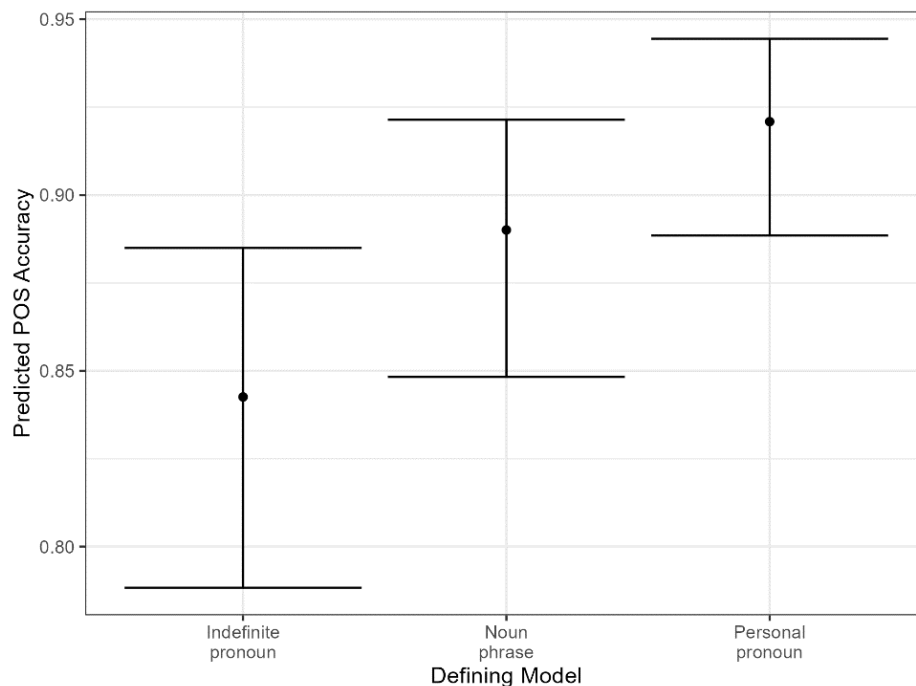


FIGURE 1. Predicted syntactic class (POS) accuracies for the three defining models, with 95% confidence intervals

Looking at the variance components of the random effects of our model (items labelled τ_{00} which stand for between-group variances in **Table 5**), we note that the model exhibits more variability due to individual participant differences (Subject) than due to Version and/or Item. This just means that there are more differences between the individual participants (students) than there are between target items.

DISCUSSION AND CONCLUSIONS

The present study has revisited the issue of POS identification by dictionary users from *when*-definitions. This general definition format, also known to occur in spontaneous defining, does not obey the common principle of substitutability. This means that a noun is not defined via a noun phrase, but rather using a *wh*-clause. Previous research has noted that this might leave dictionary users in the dark as to the syntactic class, or POS, of the headword being defined. However, some studies further noted that — for reasons that are not entirely clear — some subtypes of the *when*-definition, here termed defining models, appear to be better at conveying POS information than others. Dziemianko and Lew (2013) reported that *when*-definitions which followed the *when* + *personal pronoun/noun phrase* defining format in their experiment resulted in higher syntactic class identification accuracy than *when*-definitions which followed the *when* + *indefinite pronoun* defining style, although it must be noted that this finding was based on a small number of observations. Ptaszniak (2021) tested two such models, concluding that the *when* + *personal pronoun* defining model performed better than the *when* + *indefinite pronoun* defining model in communicating POS information to the user. The present study adds the third defining model, namely the *when* + *noun phrase* definition-type, using a bigger dataset and more robust analysis methods.

Our results show the accuracy of POS identification to be fairly high overall, but the three defining styles all differ significantly in terms of this success rate. The *personal pronoun* model (e.g.: *When **you** feel doubt about what will happen*) exhibits the highest model-predicted accuracy of 92 percent. Second best is the *noun phrase* model (*When **a person** feels doubt about what will happen*) at 89 percent accuracy. Finally, the *indefinite pronoun* defining model (*When **someone** feels doubt about what will happen*) scores the lowest at 84 percent POS accuracy. Therefore, all three research questions are answered in the positive.

Looking at the actual form of *when*-definition, there is in principle no explicit indication that the defined word is a noun. It is, therefore possible that what we interpret as ‘correct identification’ of POS is not so much identification but rather a fall-back strategy to a default, most prototypical syntactic class of word. It has been argued (Lyons, 1977, pp. 438–452; Piotrowski, 1989, pp. 80–81) that the noun holds primacy over other syntactic categories by virtue of the fact that it prototypically refers to physical objects most immediately observable and perceptible in the environment. It might then be the case that somehow the use of *you* in the definition triggers the adoption of the ‘default’ part of speech more often than for the competing defining models that make use of a noun phrase or an indefinite pronoun. This, however, remains highly speculative.

If a recommendation should be made regarding the ‘best’ defining model, then, speaking more generally, the *when*-definition model does not seem to be particularly felicitous overall. An attractive property might be its occasional use in conversation, but it is possible that this putative advantage is largely lost on non-native speakers anyway. Brevity might be another positive feature, though the *when*-definition is not necessarily shorter than the analytical format. Confusion with

respect to the part of speech of the word defined (the focus of the present contribution) speaks in general against the use of the *when-* format. What we have shown here is that this confusion is the least when the generic *you* is used in the definition, at least when defining abstract nouns. This relative advantage might well turn into a disadvantage if used to define non-nouns, but we are not aware of any major dictionary that would do this, so it remains an academic question. Finally, it might be relevant to remember that Hanks (1987) proposed a displacement strategy, whereby the use of the generic *you* should be avoided for any objectionable or questionable propositions, so as not to suggest that the dictionary user engages in anything untoward. In such cases, a more hedged variant of *someone* might be safer to use. This consideration may still take precedence over the pure empirical findings from the present study.

LIMITATIONS

In this study, we used pseudowords generated with the WordGen tool (Duyck et al., 2004), rather than actual English words. The WordGen tool has been widely used in experimental studies involving languages such as English, German, Dutch, and French, because it carries at least two important advantages: (1) it controls well for previous knowledge (non-words are not known by participants); and (2) it avoids morphological cues that, in our case, could suggest a particular syntactic class. At the same time, however, it could be argued that using non-words introduces a certain degree of artificiality to experimental designs, so this needs to be acknowledged. Overall, we believe that in a study such as ours, the benefits of using pseudo-words outweigh the disadvantages.

Another possible limitation of this study lies in the way in which syntactic class recognition of the target headwords was operationalized. We asked participants to provide their native-language (Polish) translations of the headwords and used the syntactic class of these translations. This is unambiguous, as Polish words, in their majority, can be assigned syntactic class uniquely from their form, thanks to the rich morphology of the language. However, there is a small risk that participants may have, at times, mistranslated a word with a word from a different syntactic class. The alternative was to ask them to supply syntactic labels directly, but this would introduce metalanguage and generate another potential source of error, and, perhaps more importantly, it would draw undue attention to POS information, detracting from the naturalism of the design. We did not want participants to focus specifically on POS information; rather, we were interested in the accuracy of conveying POS in a typical meaning-focused task. Also, the translation approach has been used in previous published studies.

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ABOUT THE AUTHORS

Bartosz Ptasznik is an assistant professor at the University of Warmia and Mazury in Olsztyn, Poland. His research interests include: English pedagogical lexicography, sense-navigation devices, definitions and examples in monolingual dictionaries for learners of English, as well as generative AI (ChatGPT) in lexicography. ORCID <https://orcid.org/0000-0003-0387-2966>

Robert Lew is a professor at the Lexicography and Lexicology Research Unit at Adam Mickiewicz University in Poznań, Poland. His current research interests centre around dictionary use. He has worked as a practical lexicographer and is the Editor of the *International Journal of Lexicography*.