Chapter 4

An Aspectual Classification of Polish Verbs

4.1 Introduction

Until now, this thesis has been historical and critical. In Chapter 1 we outlined some basic facts about Polish aspect and its evolution. In Chapter 2 we discussed the historical development of the concept of aspect (and Aktionsart) in the Germanic and Slavic linguistic traditions. In Chapter 3 we presented and critically discussed the work of Verkuyl, Krifka, Schoorlemmer and Filip, four representatives of recent Western work on aspect. So we have reached a critical point in the thesis: to make further progress we have to show that a verb-centered view on Polish aspect is both possible and natural.

As should be clear from the complex history recounted in Chapter 2, few writers on aspect believe that this can be done. The over-riding impression the reader is likely to have formed is that the Polish aspectual system is intrinsically complex, and that there is little hope of discerning any substantial regularity.

We will show that this impression (which is widely held in the aspectual literature) is mistaken. We shall do so by introducing a classification of Polish verbs. Our classification is formationally driven: we shall divide Polish verbs into five classes on the basis of the patterns of aspectual affixation they enter into.

But in spite of its essentially formal nature, our aspectual classification reveals considerable semantic regularity in the Polish verb system. Indeed, as we shall see, the classification induces temporal distinctions on Polish verbs, distinctions that look rather like Vendler (1957)-style distinctions. Actually, a better comparison is perhaps with the work of Moens and Steedman (1987, 1988), rather than Vendler, but for now this choice is relatively unimportant. What is important is the word ‘induced’. Vendler-style verb classifications are usually imposed from above: the linguist (or philosopher) draws distinctions on the class of verbs based on semantic intuitions. To be sure, appeal is often made to more formal criteria (notably restrictions on adverbial
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When distinguishing the classes, nonetheless the approach is essentially semantically driven. Our approach, on the other hand, is formationally driven. The formational regularities of Polish lead us to the temporal semantic distinctions — we do not impose them. We view this as strong evidence that the Polish aspectual system is highly systematic (a relatively simple formational basis, namely the patterns revealed in our classification, supports substantial semantic information) and that its function is to encode temporal distinctions.

We proceed as follows. In Section 4.2 we present our classification. In Section 4.3 we make our methodological assumptions (and in particular, our systematic use of the secondary imperfectivisation test, together with its mirror-image, a test that we call the secondary perfectivisation test) explicit. In Section 4.4 we show that the classification induces temporal distinctions: in particular, our formationally defined classes automatically induce the distinctions between culmination verbs, unitisable process verbs, culminating process verbs, process verbs, and state/gradual transition verbs. In Section 4.5 we consider ways of making the classification more fine-grained; in particular we investigate whether it is possible to induce a formationally driven distinction between state and gradual transition verbs, and examine the Polish ‘suffixisation system’ in detail. At the end of this chapter the reader should have a firm grasp of how our classification works, and of the semantic distinctions it induces (and does not induce). This paves the way for the following chapter, where we shall subject the classification to a deeper scrutiny.

4.2 A Verb Classification

Let us begin with a simple question. Suppose you are a Polish native speaker. Now, you will be well aware that Polish verbs make aspectual distinctions. But what exactly are the formational resources at your disposal that enable you to alter the aspectual meaning of Polish verbs while leaving their lexical meaning unaltered? Or to use the traditional terminology: how exactly do you go about forming aspectual pairs?

First, let us narrow the question a bit. In our classification we only consider what we call the ‘single episode’ reading of a verb, and we rule out its non-single episode readings. A verb has a single episode reading if it refers to a single actual event (taking place at a particular moment of time). A non-single episode reading is a catchall term for iterative/habitual, or generic readings.

We claim that there are four possibilities of forming aspectual pairs: we can form them by adding an empty prefix, by adding the delimitative prefix po-, by inserting the semelfactive suffix -na¸-, or by making use of suffixisation possibly combined with vowel change. As it would be tedious always to have to talk of “suffixisation possibly combined with vowel change”, from now on we shall call the fourth option morphonological change. (We take our terminology from Czochralski (Czochralski, 1975, page 15); this is our translation of his morphonologischer Wechsel.) In Section 4.5.2 we examine in detail the kinds of morphonological changes that are possible in Polish.

In what follows we shall call these four possibilities (that is, empty prefixisation, delimitative po- prefixisation, semelfactive suffix -na¸- insertion, and morphonological
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change) formants, formations, or formational possibilities. Actually, we are strongly tempted to call these operations aspe ctual formations, or aspectual formational possibilities, for (as we shall argue in the following section) we regard all four operations as aspectual in a precise sense. But at this stage such a choice of terminology would be controversial. For a start, the use of the po- prefix or -nq- suffix are not usually thought of as aspectual operations (they are usually considered to be examples of Ak- tionsart) and some readers may doubt whether their use really does alter the temporal meaning of a Polish verb while leaving its lexical meaning unaltered. Moreover, as we mentioned in Chapter 2, many writers on aspect deny the existence of empty prefixes altogether. In short, of the four formants used in the classification, only one (namely morphonological change) is uncontroversially regarded as truly aspectual. So — for the time being — we shall stick to the more neutral terminology of ‘formants’ and ‘formational possibilities’. Nonetheless, by the end of the chapter we will have given strong evidence that these four formalional possibilities are the operations that lie at the heart of the Polish aspectual system.

Having isolated these four classes of formalional operation, we now make a simple observation: different verbs select different formalional possibilities. This leads to the question which gives us the classification: how much system is there to this? That is, what exactly are the possible verb/formant combinations? An examination of the data shows that if we classify Polish verbs on the basis of the formalional possibilities they can enter into, we obtain five classes. Here is the resulting Polish verb classification in the form of a table:

<table>
<thead>
<tr>
<th></th>
<th>ep</th>
<th>po-</th>
<th>-nq-</th>
<th>mpc</th>
</tr>
</thead>
<tbody>
<tr>
<td>class(_1)</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>class(_2)</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>class(_3)</td>
<td>yes</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>class(_4)</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>class(_5)</td>
<td></td>
<td></td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

The top line of the table reads as follows: ep stands for empty prefix, po- is the delimitative prefix po-, -nq- is the semelfactive suffix -nq-, and mpc stands for morphonological change (vowel change and/or suffixisation of a perfective verb; a particularly simple example of morphonological change is insertion of the -yw- suffix).

The table should be read as follows. Each row records the formalional possibilities open to a member of the relevant verb class. For example the first row tells us that a verb is a class\(_1\) verb if its sole formalional possibility is to take an empty prefix. The second row tells us that a verb is a class\(_2\) verb if its sole formalional possibility is to take the delimitative prefix po-. And to give a more complicated example, the fourth row tells us that a verb is classified as class\(_4\) if it has precisely three formalional possibilities: it takes an empty prefix, the po- prefix, and can be suffixised by -nq-. As this last example shows, our use of ‘yes’ in the above table is conjunctive. Thus the two yeses in row three mean that class\(_3\) verbs have both the formalional possibilities (ep and delimitative po-) indicated.
A general remark. Sometimes a single morphological operation can be used in several ways semantically. For example, the class 3 verbs are imperfectivized by morphological changes, and in many cases this amounts to using -yw- as a suffix. But this same suffix may be applied to some other verbs to produce a different semantic effect: we can also suffixise imperfective *pisać* ‘to (be) writ(ing)’ (a class 3 verb) by -yw-, an operation which results in *pisywać* ‘to write from time to time/have a habit of writing’ (that is, with some verbs -yw- suffixisation can be used to form a verb with an iterative/habitual reading). But such combinations are not relevant to our classification and are not included in the table. For a start, in such combinations, the suffix is not used as a formant deriving an aspectual twin of the basic imperfective verb (iterative verbs are imperfective). Moreover, as we said above, our classification rules out non-single episode readings such as for instance iterative/habitual reading. In addition, applying the suffix -yw- to derive iterative/habitual verbs is not a productive process in contemporary Polish, and the few still existing iterative/habitual verbs involving the suffix -yw- should rather be treated as fossilized (that is, lexicalized) combinations of a basic verb and a formant. Polish native speakers would view *pisywać*, the iterative/habitual form, as a semantically distinct verb from *pisać*; that is, in this case the -yw- suffixisation has induced a shift in lexical meaning, and indeed *pisywać* has a different dictionary entry.\(^1\) Our table covers only those verb/formant combinations which we regard as genuinely aspectual. Roughly speaking, this means that they “change temporal meaning while leaving lexical meaning unaltered”. We shall give a precise definition in the following section.

But why do we use the words ‘formants’, ‘formations’, and ‘formational possibilities’ to refer to suffixes or prefixes? Essentially, because we wish to abstract away from whether prefixisation or suffixisation is used. Indeed, we wish to abstract away from whether the underlying mechanism was word-formational (derivational) or inflectional (grammatical). As we said in Chapter 1, the word ‘formant’ is a crucial analytical term used in word-formational analysis, as opposed to morphematic analysis, in which one speaks of morphemes (prefixes, suffixes, and so on). The word-formational analysis does not decompose a word into minimal units (that is morphemes), as morphematic analysis does. Rather, its goal is to capture the mechanism deriving that word. Hence, it always decomposes the word into two elements: the ‘basic’ word (that is, the word from which the analysed word was derived) and the ‘formant’ (that is, the morpheme used to derive the analysed word from the basic word); extracting the ‘formant’ is crucial.

We use the terminology of word-formational analysis to describe the mechanism of deriving aspectual twins; and so we view an aspectual pair as crucially consisting of a (aspectually) basic verb and a complex verb, which is derived from the basic verb by means of an aspectual formant. Let us spell this out. We refer to the empty prefix, the delimitative prefix *po-*, the semelfactive suffix *-nq-*, and mpc as ‘formants’ that are used to derive an aspectual twin for a certain ‘basic’ verb. We are not interested in

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1The view that iterative verbs and the corresponding single-time imperfective verbs function in contemporary Polish as different lexical items, is defended by Czochralski (Czochralski, 1975, page 23); a similar view on Russian iterative verbs was defended by Isačenko (Isačenko, 1962, page 405).
these morphemes as such — that is, in all the functions that they can fulfill in the Polish language. In fact, it is precisely what we wish to abstract away from. Working at the higher level of formants enables us to see regularities obscured by the morphematic analysis: the regularities revealed by the classification.

As this classification underlies our work in the remainder of the thesis, it is important to understand it fully. In particular, it is important to realize that it is intended to be a classification in the strong sense of the word: it provides necessary and sufficient conditions strong enough to assign every Polish verb (to which it applies) to a unique class. The simplest way of making this point is to present the classification once again, this time in the form of a Prolog program:

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\begin{verbatim}
class_1(X) :- formant(X, ep(_), -po, -na, -mpc).
class_2(X) :- formant(X, -ep, po, -na, -mpc).
class_3(X) :- formant(X, ep(_), po, -na, -mpc).
class_4(X) :- formant(X, ep(_), po, na, -mpc).
class_5(X) :- formant(X, -ep, -po, -na, mpc).
\end{verbatim}

This is a very simple program, and its sense should be clear. For example, the first line says that \(X\) belongs to \textit{class\_1} if \(X\) is a verb that takes an empty prefix (note the \texttt{ep(\_)}), but does not take \texttt{po-} (note the \texttt{-po}), does not take \texttt{-na} (note the \texttt{-na}), and does not undergo morphonological change (note the \texttt{-mpc}). Observe that we use Prolog’s anonymous variable (the \texttt{\_} in \texttt{ep(\_)}) to record the fact that while there must be some value for the empty prefix, it is irrelevant which prefix it actually is. Now consider the fourth line. This says that \(X\) belongs to \textit{class\_4} if \(X\) is a verb that takes an empty prefix (note the \texttt{ep(\_)}) and \(X\) also takes \texttt{po-} (note the \texttt{po}) and \(X\) also takes \texttt{-na} (note \texttt{na}), but \(X\) does not undergo morphonological change (note the \texttt{-mpc}).

In short, this program is a full declarative specification of the classification, and (given the required lexical information) it assigns each Polish verb a unique class. Moreover, since Prolog has a procedural interpretation, we can use it to compute these class assignments. For example, suppose we are working with the following (toy) Polish lexicon:

\begin{verbatim}
formant(blednac, ep(z(a)), -po, -na, -mpc). % to be growing pale
formant(ciemniec, ep(z(a)), -po, -na, -mpc). % to be becoming dark
formant(czytac, ep(prze), po, -na, -mpc). % to be reading
formant(dac, -ep, -po, -na, mpc). % to have given
formant(gotowac, ep(u), po, -na, -mpc). % to be cooking
formant(grubnac, ep(z(a)), -po, -na, -mpc). % to be growing fat
formant(gwizdac, ep(z(a)), po, na, -mpc). % to be whistling
formant(jesc, ep(z(a)), po, na, -mpc). % to be eating
formant(kochac, ep(po), -po, -na, -mpc). % to be loving
formant(krzyczec, ep(z(a)), po, na, -mpc). % to be shouting
\end{verbatim}

\textsuperscript{2}Why the caveat “to which it applies”? Because there are a small number of Polish verbs to which this classification is not intended to apply. For example, a handful of Polish verbs come in suppletive pairs (that is, there is no morphological link between the two verbs in the pair; the perfective and imperfective forms are two completely distinct words). In addition, the classification is not intended to apply modal verbs or habitual/iterative verbs. We discuss these restrictions in Chapter 5.

\textsuperscript{3}For an easy introduction to Prolog see the online introduction ‘Learn Prolog Now!’ by Patrick Blackburn, Johan Bos and Kristina Striegnitz: http://www.colt.uni-sb.de/ kris/learn-prolog-now/
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formant(kupic, -ep, -po, -na, mpc). % to have bought
formant(madrzec, ep(z(a)), -po, -na, -mpc). % to be becoming wise
formant(migac, ep(z(a)), po, na, -mpc). % to be twinkling
formant(mrugac, ep(z(a)), po, na, -mpc). % to be winking
formant(pik, ep(wy), po, -na, -mpc). % to be drinking
formant(pisac, ep(na), po, -na, -mpc). % to be writing
formant(pracowac, ep, po, -na, -mpc). % to be working
formant(pukac, ep(z(a)), po, na, -mpc). % to be knocking
formant(rozumiec, ep(z(a)), -po, -na, -mpc). % to be understanding
formant(rysowac, ep(na), po, -na, -mpc). % to be drawing (a picture)
formant(siedziec, -ep, po, -na, -mpc). % to be sitting
formant(spacerowac, -ep, po, -na, -mpc). % to be walking
formant(tupac, ep(z(a)), -po, -na, -mpc). % to be stamping (one's feet)
formant(ufac, ep(z(a)), -po, -na, -mpc). % to be trusting
formant(wierzyc, ep(u), -po, -na, -mpc). % to be believing
formant(wrocic, -ep, -po, -na, mpc). % to have come back

(The meaning of these entries should be clear. For example the entry for czytac tells us that it is a verb that takes an empty prefix (namely prze-) and the delimitative prefix po-, but that does not take the -ng- suffix nor undergo morphonological change. The entry for wrocic tells us that this is a verb which does not take an empty prefix, does not take po-, does not take -ng-, but which does undergo morphonological change.)

Computing the class assignments (that is, classifying the lexicon) is merely a matter of posing Prolog queries. For example the query

?- class_1(V).

extracts all the class1 verbs (namely blednac, ciemniec, grubnac, kochac, madrzec, rozumieć, ufac, and wierzyć), and the query

?- class_4(V).

extracts all the class4 verbs (namely gwizdac, krzyczec, migac, mrugac, pukac, and tupac).

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We must now take a closer look at the ideas underlying this classification. First, we have said that the classification is 'essentially formal', but what exactly do we mean by this? Second, the only reason we have given for our choice of formational possibilities is that they are the ones which "change temporal meaning without changing underlying lexical meaning". This seems a somewhat flimsy basis on which to build; is it not possible to give the classification a more solid grounding? It is crucial to address this issue. The key claim of this chapter is that our aspectual classification automatically induces aspectual distinctions — but this claim will only be interesting if the classification has a firm foundation.

Let's begin with the first question. In what sense is this classification formal? The most obvious answer is this. Given a Polish verb, once we know which of the four formants (empty prefix, delimitative po-, semelfactive -ng-, and morphonological
change) can be legitimately applied, there is no further question as to which class the verb belongs to: the definitions embodied in the table fix the matter once and for all. Or to put it in terms of Prolog, once we have fixed our lexicon, there is no room for debate as to how to classify a particular verb: the answer can be straightforwardly computed using the five Prolog rules.

But there is a second (and deeper) sense, in which our classification is formal, and this sense leads to an answer to the second question. When we are given a verb to classify, the crucial decision to make is which of the four formants (empty prefix, delimitative po-, semelfactive -na¸-, and morphonological change) change the temporal meaning without changing the lexical meaning. Or to rephrase this in traditional terminology, the key point is to decide which kinds of formational operation give rise to aspectual pairs. But how exactly should we go about making this decision?

Now, in some cases this is uncontroversial. In particular, there is no dispute about how to do this for class5 verbs. This class contains only perfective verbs (this is clear from the table: recall that morphonological change is simply our Czochralski-style terminology for “suffixisation possibly combined with vowel change”, and this is the operation which converts perfective verbs into imperfective verbs). Given any such verb, any Polish native speaker (and indeed, any Polish linguist) would agree that morphonological change is a process that gives rise to genuine aspectual pairs.

But what about the first four classes? The verbs in these classes are all imperfective (this is clear from the table: prefixisation, whether by empty prefixes or delimitative po-, and suffixisation by -na¸- convert imperfective verbs to perfective verbs) and here matters are more controversial. For a start, as we mentioned in Chapter 1, some authors question the very existence of empty prefixes. Moreover, our classification adds fuel to the fire: not only does it treat empty prefixes as a legitimate aspectual forming operation, it also treats the delimitative po- prefix and the semelfactive -na¸- suffix (both of which are standardly thought to lead to a change in Aktionsart) as aspectual devices. Furthermore, our classification leads to consequences that may seem strange on first acquaintance: in our approach (as the table makes clear) while some verbs have only one aspectual twin (namely verbs belonging to class1, class2, and class4), verbs belonging to class3 have two aspectual siblings, and verbs belonging to class4 have three. This isn’t a traditional way of thinking about Polish aspect.

Given all this, it would be highly unsatisfactory if we simply rested our classification on the (suspiciously hard to verify) claim that empty prefixisation, delimitative po- prefixisation, and semelfactive -na¸- suffixisation are all operations that “change temporal meaning without changing lexical meaning”. Semantic intuitions tend to be fuzzy and the best of times — and the judgment involved here is particularly subtle. We need a more solid foundation.

And a suitable foundation is available: the secondary imperfectivisation test. We introduced this test in Chapter 2. In essence, the test replaces the (difficult) question of deciding whether a perfectivisation operation “changes temporal meaning without changing lexical meaning” with a simpler question: how can we imperfectivise a verb that we have just built by a perfectivising operation? If the only way of doing this is to ‘undo’ the perfectivising operation and return to the original imperfective verb,
then the test tells us that we have found a genuine aspectual pair. On the other hand, if we can apply morphonological change to the perfectivised form (that is, if we can re-imperfectivise without returning to the original verb) then we are not dealing with an aspectual pair. As we are going to use this test heavily in what follows, let us formulate it more precisely:

The Secondary Imperfectivisation Test

Let \textit{impf-verb} be an imperfective verb, and let \textit{Perf(impf-verb)} be a perfective verb formed from it by applying either a prefix or the \textit{-na-} suffix. Then:

1. If the only way of imperfectivising \textit{Perf(impf-verb)} to obtain a verb with a single episode meaning is to return to the original verb (that is, \textit{impf-verb}) then we say that \textit{impf-verb} passes the secondary imperfectivisation test, and that \textit{Perf(impf-verb)} and \textit{impf-verb} are aspectual pairs.

2. On the other hand, if \textit{Perf(impf-verb)} can be imperfectivised to a verb with a single episode meaning by some other means, then we say that \textit{impf-verb} fails the secondary imperfectivisation test, and that \textit{Perf(impf-verb)} and \textit{impf-verb} are not aspectual pairs.

One way of thinking about the test is this. (Actually, we don’t fully agree with the following way of thinking about the test, but more on that later; meanwhile it is a useful starting point.) If perfectivisation followed by imperfectivisation does not take us back to the original (imperfective) verb, then this suggests that some non-temporal component of meaning has crept in along the way. On the other hand, if perfectivisation followed by imperfectivisation is only possible by moving back to the original verb, then this suggests that the operations involved only temporal changes of meaning, and hence that we are dealing with genuine aspectual pairs. The joy of this test is that it enables us to replace subtle semantic judgments ("Is this really a purely temporal change, or has some change of lexical meaning sneaked in?") by a formal criterion: what are the secondary imperfectivisation possibilities? Moreover, it gives precise (indeed, elegant) content to the pre-theoretical intuition that Polish verbs come in aspectual pairs.

The test has a long history. It was used for Russian by Stender-Petersen (Stender-Petersen, 1933/34, page 331f.), Lomtev (Lomtev, 1958, page 245f.), Forsyth (1970), among others; for Polish by Klemensiewicz (Klemensiewicz, 1951, page 653), among others. Some scholars do not refer to this test explicitly, but they base their investigations on the logic that underlies it — for instance, Czochralski (1975). He assumes that one of the distinctive features of the category of aspect is that it is a \textit{binary} category, which means that it does not form ‘aspectual \textit{triples}’ (Czochralski, 1975, page 18). Some authors (notably, Bogusławski (Bogusławski, 1963, page 107)) have questioned the reliability of the secondary imperfectivisation test, pointing to verbs such \textit{balsamować} ‘to embalm (a corpse)’ (which can be perfectivised to \textit{zabalsamować}...
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and then re-imperfectivised to zabalsamowywać, and planować ‘to plan’ (which can be perfectivised to zaplanować and then re-imperfectivised to zaplanowywać. But it is debatable whether these are genuine counterexamples. The primary reading of both the secondary imperfectivised forms is iterative, not single episode, and in any case such examples are rare and do not seem to be widely used (an examination of the 60 million word Corpus of the Polish Dictionaries Department of PWN Scientific Publishers reveals no instances of the re-imperfectivised forms).

We have defined the test in a slightly more general way than these authors do. The test is usually used on verbs perfectivised by prefixisation (indeed, the test is normally used to support the concept of empty prefixes). However the test also makes perfectly good sense when used with verbs perfectivised by the -na- suffix. Let’s systematically apply the test to representative verbs from the classes 1 through 4 to check that it works as claimed.

To form an aspectual twin of a class 1 verb we add its empty prefix. For example, wierzyć ‘to be believing’ becomes uwierzyć ‘to start to believe’; rozumieć ‘to be understanding’ becomes rozumieć ‘to start to understand’; mądrzeć ‘to be becoming wise’ becomes zmądrzeć ‘to have become wise’; and gruniec ‘to be becoming fat’ becomes zgruniec ‘to have become fat’. Why do we regard these verbs as aspectual pairs? Because we cannot undo the perfectivising effect of the empty prefixes in any other way than by going back to the original verb. That is, as our classification claims, we can view these verbs as aspectual pairs because they pass the secondary imperfectivisation test.

To form the aspectual twin of a class 2 verb we apply the delimitative prefix po-. For example, from siedzieć ‘to be sitting’ one can derive posiedzieć ‘to have sat for a while’, from spacerować ‘to be walking’ one can form pospacerować ‘to have walked for a while’. But is the complex delimitative verb really a true aspectual twin of the original verb? According to the secondary imperfectivisation test, yes. Why? Because there is no way of imperfectivising posiedzieć and pospacerować other than going back to siedzieć and spacerować respectively.

Class 3 verbs are a more complicated case — our classification claims that two formational operations are legitimate here: we can form aspectual twins using either an empty prefix or the delimitative prefix po-. For example, the verb pisać ‘to be writing’ can be prefixed by its empty prefix na- to form napisać ‘to finish writing’/’to have written’. But it can also be prefixed by po- to form popisać ‘to have written for some time’. In both cases, the only way to undo the effect of the perfectivisation is to go back to the original verb. Hence (by appeal to the secondary imperfectivisation test) we view both napisać and popisać as aspectual siblings of pisać.

Class 4 verbs are even more interesting — our classification claims that three formational operations are legitimate here: they can either take an empty prefix, the delimitative prefix po-, or the semelfactive suffix -na-. For example, from pukać ‘to

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4It should be noted, that Bogusławski’s contributions to the prefixisation issue are based on Russian, and not Polish. It seems that in Russian, aspectual triples can occur considerably more often than in Polish; some verbs that he uses as examples, do not occur in the corpus of Polish verbs (although they sound familiar to Polish native speakers). However, it should be noted that Russian secondary imperfective verbs seem to have iterative and not single episode reading.
be knocking’ we can form zapukać ‘to have knocked’, popukać ‘to have knocked for a while’, and puknąć ‘to have knocked once/briefly’. In all three cases, the only way to imperfectivise (with a single episode reading) is to go back to the original verb. Hence the secondary imperfectivisation test says that zapukać, popukać and puknąć are aspectual siblings of pukać. One final remark: popukać ‘to have knocked for some time’ can also be imperfectivized by insertion of the suffix -iw-, as a result of which the event of having knocked for a while is iterated: we get popukiwać ‘to knock repetitively for some time’. But this verb does not have a single event reading.

Summing up, the secondary imperfectivisation test plays an important role for us: in the controversial cases (that is, in all cases that do not involve class 5 verbs) we use it as our touchstone to identify aspectual pairs and justify the judgments embodied in the classification. It allows us to avoid deciding when there has been a change of temporal meaning without an accompanying change of lexical meaning, and adds weight to our claim that the classification is essentially formal.

Indeed, so useful do we find the secondary imperfectivisation test as a basis for aspectual investigations, that we find ourselves unsatisfied with our original ‘justification’ that morphonological change is an aspectual operation. Recall that we simply remarked that “any Polish native speaker (and indeed, any Polish linguist) would agree that morphonological change is a process that gives rise to genuine aspectual pairs”. This is certainly the received view — but what exactly is it that gives rise to this certitude? What exactly is it that conventional wisdom rests on here? We shall answer this by formulating a mirror image of the secondary imperfectivisation test that we call the secondary perfectivisation test:

**The Secondary Perfectivisation Test**

Let perf-verb be a perfective verb, and let impf(perf-verb) be an imperfective verb formed from it by morphonological change. Then:

1. If the only way of perfectivising Impf(perf-verb) to obtain a verb with an single episode meaning is to return to the original verb (that is, perf-verb) then we say that perf-verb passes the secondary perfectivisation test, and that Impf(perf-verb) and perf-verb are aspectual pairs.

2. On the other hand, if Impf(perf-verb) can be perfectivised to a verb with single episode meaning by some other means, then we say that perf-verb fails the secondary perfectivisation test, and that Impf(perf-verb) and perf-verb are not aspectual pairs.

The secondary perfectivisation test pins down the pre-theoretical conviction that morphonological change gives rise to aspectual pairs. For example, the perfective verb kupić ‘to have bought’ imperfectivises by morphonological change to kupować ‘to be buying’. How can we re-perfectivise? Actually, there aren’t many options available here. We could apply the po- prefix, but this would yield the verb pokupować ‘to be buying on several occasions’, a distributive verb, not a single episode verb. If
we want a single episode perfective verb, we simply have no choice: we have to go back to kupić. We conclude that kupić and kupować are aspectual pairs. In short, the secondary perfectivisation test is a common sense formalization of the native speaker perception that two verbs belong together.

Moreover, the secondary perfectivisation test is obviously the mirror image of the secondary imperfectivisation test. That is, we have placed both directions of aspectual shift (from perfective to imperfective, and from imperfective to perfective) on the same methodological footing. We are viewing the entire Polish aspectual system in an essentially formal (and conceptually uniform) fashion.

Actually, we should add that in a certain sense we are duty-bound to introduce the secondary perfectivisation test. A traditional Slavic linguist need not bother to do so precisely because he or she uses suffixisation as inherently grammatical in a way that prefixisation is not. That is, by appealing to the theoretical distinction between prefixisation and suffixisation, the traditional Slavic linguist can avoid justifying the claim that suffixisation gives rise to aspectual pairs. However, the whole point of our formant-based approach is that we are committed to treating all formants, whether they be prefixisations or suffixisations, in a uniform way. So if we explained aspectual pairing for primitive imperfective forms in terms of the impossibility of having secondary imperfectives, we are duty-bound to explain aspect pairing in terms of impossibility to creating secondary perfectives. To put it in a nutshell, we have opted to work at a more abstract level of formants. Therefore, it is part of our task to devise criteria which work in a more uniform way at a more abstract level.

Now is an excellent time to explain our earlier remark that we don’t like to explain the secondary imperfectivisation test (or for that matter, the secondary perfectivisation test) in terms of whether or not some some non-temporal component of meaning has crept in. While this may be a helpful intuition pump, it puts the semantic cart before the morphological horse.

In our view, the interesting observation about Polish that requires explanation is that its verbs come in aspectual pairs (true, not all do, but the vast majority do, and Polish native speakers tend to ‘think in pairs’). The secondary imperfectivisation and perfectivisation tests require no better justification than this: they are a superb way of making this observation precise. Indeed, not only do these tests require no justification in terms of “showing whether some non-temporal component of meaning has crept in”, to think in such terms is (in our view) methodologically misguided.

The point is this. The four affixational possibilities on which our classification is based are justified in terms of the secondary imperfectivisation and perfectivisation tests. That is, we have given an essentially formal map of how different Polish verbs give rise to aspectual pairs. Having done this, we are now free to move on and ask a more interesting question: which semantic distinctions are supported by aspectual distinctions? Now, as it will become clear in the following section, we feel that the claim that aspectual pairs differ only in temporal meaning is an excellent approximation to the truth. Nonetheless, with at least two modifications that we regard as aspectual (namely delimitative po- prefixisation, and semelfactive -nq- suffixisation) it is possible to entertain doubts. To raise the kinds of doubts that have been raised in
the literature: doesn’t delimitative po- seem to add a flavour of agentivity? And can the ‘one time/briefly’ reading that -na ¿ gives rise to truly be described as “temporal”? Now, we feel that both delimitative po- prefixisation, and semelfactive -na ¿ suffixisation are best thought of in temporal terms — but it is important to note that such a view is not forced on us (as we will see in the following chapter, it is straightforward to formalize their semantics in terms of simple models of eventualities on a flow of time). We do not start with the assumption that aspectual pairs “differ only with respect to the temporal component of meaning”. Rather, the whole point of our investigation is to formalize the notion of aspectual pairs (ultimately in terms of the secondary imperfectivisation and perfectivisation tests) and then to ask which semantic distinctions they actually give rise to. As it turns out, it seems to us that the distinctions they support are best described as temporal (indeed, it will turn out that the traditional binary opposition between ongoing and completed is fairly close to the truth) — but if it could be shown that some of the aspectual distinctions we have drawn change a non-temporal component of meaning as well, then that is perfectly acceptable (and indeed, very interesting). To repeat the mantra with which this chapter started: we want to see what distinctions the aspectual system induces. We don’t want to start by assuming answers to subtle semantic questions.

Our methodological discussion is almost done. To close this section, let us change direction somewhat. Until now we have been emphasizing the formal nature of our classification. But it should be clear that our approach doesn’t banish all semantic intuitions; rather, it attempts to control and minimize them. So what exactly are the semantic intuitions on which our classification rests? To put it another way, when we say that our classification is “essentially formal”, what is the content of the “essentially”?

Our approach presupposes the ability to make two main kinds of semantic judgment. Firstly, our approach assumes that native Polish speakers can judge whether there is an alternative to ‘undoing’ a perfectivising or imperfectivising operation on verbs that yield single episode readings. Secondly, our approach assumes that they can distinguish delimitative uses of po- from its use as an empty prefix. Now, the first of these abilities is the semantic expertise required to apply the secondary imperfectivisation test or the secondary imperfectivisation test, and it seems safe to claim that Polish native speakers are capable of making such judgments.

The second semantic judgment required (distinguishing delimitative po- from empty uses of po-) also seems unproblematic. The delimitative use of po- is strongly ‘felt’ by native speakers. But unless it was pointed out to them, native speakers of Polish probably wouldn’t notice that the empty prefix used to perfectivise kocha¿ ‘to be loving’ (namely po-) is formally the same prefix as is used to give a delimitative reading to a verb like krzycz¿ ‘to be shouting’. An interesting verb in this respect is the class_3 verb malowa¿ ‘to paint an object’ (that is, it is equivalent to the Dutch verven rather than schilderen). Now, being a class_3 verb, this verb takes delimitative po-, and also has an empty prefix — and the interesting thing about this verb is that po- is its empty prefix. Thus both formants build the same derived form, namely pomalowa¿. But although there is only one derived form, it has two distinct senses. The pomalowa¿
formed using the empty prefix means to finish painting something. There is strong feeling of culmination, and moreover there is a distinct feeling of 'aboutness' — that is, there is some object or other that is being painted. Delimitative pomalować, on the other hand, means something like "to have been painting for some time and then to carry on with something else". There is no sense of culmination, and no sense that anything in particular is being painted. That is, this verb focuses on the activity of painting — the object being painted fades from view. No native speaker would doubt that pomalować can mean two quite different things.

### 4.4 Induced semantic distinctions

In the previous section we classified Polish verbs by noting which of the four formational possibilities (empty prefixes, delimitative po-, semelfactive -ng-, and morphological change) they selected for. In constructing our classification we avoided the use of subtle semantic judgments (and in particular, we avoided claiming that these formants "changed the temporal meaning without affecting the lexical meaning"). Instead, we relied on two essentially formal criteria: the secondary imperfectivisation test and the secondary perfectivisation test. Our investigation lead us to classify Polish verbs into five classes, each class specified solely in terms of formational possibilities.

And now for the key claim of the chapter: although essentially formal, our classification induces a temporal classification of Polish verbs. In particular, we claim that the following generalizations hold: class 1 verbs are either state verbs or gradual transition verbs; class 2 verbs are process verbs; class 3 verbs are culminating process verbs; class 4 verbs are unitisable process verbs; and class 5 verbs are culmination verbs.

To put it another way, we claim that the Polish aspectual system encodes the distinction between states/gradual transitions, processes, culminating processes, unitisable processes and conclusions. That is, we claim that our original classificatory table can be rewritten as follows:

<table>
<thead>
<tr>
<th></th>
<th>ep</th>
<th>po-</th>
<th>-ng-</th>
<th>mpc</th>
</tr>
</thead>
<tbody>
<tr>
<td>state/gradual transition</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>process</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>culminating process</td>
<td>yes</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unitisable process</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>culmination</td>
<td></td>
<td></td>
<td></td>
<td>yes</td>
</tr>
</tbody>
</table>

Or to put it in terms of Prolog, we claim that our Prolog code can be rewritten as follows:

```prolog
state_or_gradual_transition(X) :- formant(X, ep(_), po, -na, mpc).
pncept(X) :- formant(X, -ep, po, -na, mpc).
culminating_process(X) :- formant(X, ep(_), po, -na, -mpc).
unitisable_process(X) :- formant(X, ep(_), po, na, -mpc).
culmination(X) :- formant(X, -ep, po, -na, mpc).
```

The remainder of this chapter is devoted to exploring this claim. In this section we make our claim more precise: that is, we shall explain what we mean by 'pro-
cess verbs’, ‘culmination verbs’, ‘culminating process verbs’ and so on. Much of the temporal terminology we shall use when discussing these concepts (for example ‘culminations’, ‘culmination points’, and so on) is taken from the work of Moens and Steedman (1987, 1988). Some of the terminology we will use (notably states and process) is wide-spread in the aspectual literature; some of the terminology (notably culminations and culminating processes) is borrowed from Moens and Steedman (1987, 1988), and some of this terminology (notably gradual transitions and unitisable processes) was specially devised in an attempt to accurately describe the Polish data.

4.4.1 Class 5 verbs are culminations

If a verb is in class 5, it is perfective and is imperfectivized by means of a morphonological change. For example, perfective *kupić* ‘to have bought’ becomes imperfective *kupować* ‘to be buying’ by replacing *i* by *owa*; perfective *wrócić* ‘to have come back’ derives its imperfective counterpart *wracać* ‘to be coming back’ by changing *i* to *a* (and in this case the vowel change is accompanied by an additional vowel change in the root). In Section 4.5 we shall describe in detail the kinds of morphonological change that class 5 verbs undergo; here we wish to discuss their temporal semantics.

We have claimed that class 5 verbs are ‘culminations’. What do we mean by that?

The (lexically encoded) temporal meaning of culmination verbs make reference to the notion of change: culminations lexically refer to a change of state that is instantaneous and has no degrees.\(^5\) Consider, for example, the perfective *kupić* ‘to have bought’. This refers to the moment of buying, the switch from “not yet belonging to the buyer” to “belonging to the buyer”.

The term ‘culmination’ is taken from Moens and Steedman (1987, 1988). Another term for class 5 verbs might be ‘achievements’, Vendler (1957). For example, *wygrać* ‘to have won’ (which imperfectivises by morphonological change to *wygrywać* ‘to be winning’) is also a class 5 verbs, and this example clearly suggests the intuition of achieving something. Nonetheless, the underlying notion of achievement is usually less vivid than this; consider, for example, *wrócić* ‘to have come back’ and its imperfective twin *wracać* ‘to be coming back’. The term ‘culmination’ (which conveys the idea that some critical time has been reached, without carrying the overtones of success that ‘achievement’ does) is more appropriate for such verbs, and hence we prefer Moens and Steedman’s terminology.

Culmination verbs have imperfective twins. What do these describe? Typically, the process that led up to the culmination point. That is, although Polish culmination verbs only refer to the culmination point, the process that led up to the culmination point is defined for culminations. Depending on the lexical semantics of the particular verb, it will be more or less plausible to explicitly refer to this preparatory process, and when it is plausible, this is what the imperfective form picks out.

\(^5\)Such understanding of ‘change’ is inherent in the ‘Cambridge conception’ of ‘change’. This term refers to Russell’s definition of change in terms of a change of truth value of a proposition (Russell, 1913, page 442). The Russelian conception has become a standard way of defining ‘change’ in contemporary linguistic literature; see for instance Kamp (1979), Kamp (1980), Rothstein (2002).
For example, in Polish it is easy to refer to the process of coming back home or a process of buying fruits on the marketplace by using the imperfective forms *wracać* and *kupować* respectively. On the other hand, it is not so easy to refer to the process of recognizing a friend in a group of people on the other side of a pedestrian crossing using *rozpoznać* (the imperfective form of *rozpoznać* 'to recognise'). But the reasons for this seem non-linguistic; recognizing a person is a cognitive process that typically takes place very fast. We certainly can use *rozpoznać* to refer to the process of recognition of the importance of a certain thing in one’s life (a process that is often too slow for comfort).

Our description of the temporal semantics of Polish culmination verbs unifies two different approaches to culmination/achievements which can be found in the linguistic literature. One approach says that achievements refer to an instantaneous change of state and do not refer to the process that might have led up to that change — see for example, Rothstein (2002). Another approach proposes that certain achievement verbs are preceded by a ‘durative prelude’ — see Kearns (1991), Delfitto and Bertinetto (1995), Delfitto (2002). To correctly describe the semantics of Polish culmination verbs we need both ideas: we need to say that while culmination verbs only refer to the culmination point, in their imperfective form they may very well refer to the process that led up to the culmination point, for this process is defined for them. If talking about this process is natural, as in case of events of ‘coming back’ or ‘buying something’, the imperfective forms denoting such processes (*wracać* ‘to be coming back’ and *kupować* ‘to be buying’) will primarily refer to one single (culminating) event being in progress. But because we usually do not think of a process of ‘recognizing somebody’ or ‘discovering a treasure’ as something that takes time, imperfective forms of verbs denoting such events (*rozpoznać* ‘to be recognizing’ and *odkrywać* ‘to be discovering’) will tend to be interpreted as denoting a (temporally extended) event consisting of iterated single events of ‘recognizing’ or ‘discovering’.

Let’s go a little deeper into this point. Can verbs such as ‘recognizing somebody’ or ‘discovering a treasure’ be forced to take a single event reading? Yes, they can. For example, consider the sentence *Rozpoznawał ją przez pięć godzin* ‘It took five hours before he recognized her’. This makes perfect sense if it occurs as the climax of a detective story about a police surgeon examining a corpse in the city morgue. In essence, the supporting story is bending the meaning of the underlying verb phrase — we are being forced from the ‘default’ idea that recognizing a person is a fast process to the idea that recognition of a person can be a long, drawn-out, investigatory process. But in our view such a ‘reconstructed’ process (or, to use Rothstein’s terminology: ‘derived’ process (Rothstein, 2002, page 48ff.)) should not normally be viewed as forming a natural part of the event. Hence (contrary to Rothstein) we don’t believe that the possibility of a ‘forced’ interpretational effect should be taken as the characteristic semantic property of Polish culmination verbs. Additional semantic effects seem to be at work in such cases.

In a nutshell — no force required. The characteristic property of a culmination in Polish is that it can be explained as being the result of a (culminating) process. A process of recognizing the real meaning of a scientific theory, or the discovery of
an ancient city will usually take time, and it is natural to think and talk about such processes as developing towards a definite change — a change that introduces the consequent state of somebody having a deep understanding of all the implications of a theory, or of the whole ancient city being discovered. In Polish, this definite change is expressed lexically, namely by the (perfective) form of a culmination verb.

The reader should now have a reasonable understanding of what we mean by culminations. The reader may like to consider the following list of class 4 verbs and our claim that they are all culminations:

- odkryć ‘to have discovered’,
- zdobyć ‘to have gained’,
- osiągnąć ‘to have achieved’,
- podpisać ‘to have signed’,
- nagrąć ‘to have recorded’,
- wygrać ‘to have won’,
- zauważyć ‘to have noticed’,
- odrzucić ‘to have rejected’,
- zmienić ‘to have changed’,
- zwyciężyć ‘to have overcome’,
- zmartwychwstać ‘to have risen from the dead’,
- przyjechać ‘to have arrived (in a vehicle)’,
- odjechać ‘to have left (in a vehicle)’,
- wstać ‘to have gotten up’,
- otworzyć ‘to have opened’,
- zamknąć ‘to have closed’,
- zacząć ‘to have started’,
- skoczyć ‘to have jumped’,
- rozpaść się ‘to have disintegrated (reflexive)’,
- zakochać się ‘to have fallen in love (reflexive)’.

4.4.2 Class 4 verbs are unitisable processes

If a verb is class 4, it has three aspectual siblings: one formed by an empty prefix, one formed by the delimitative prefix po-, and one formed by the semelfactive suffix -na-. For example, from pukać ‘to be knocking’ we can derive zapukać ‘to have knocked’, popukać ‘to have knocked for some time’, and puknąć ‘to have knocked once’; from krzyczeć ‘to be shouting’ we can derive zakrzyczeć ‘to have shouted’, pokrzyczeć ‘to have shouted for some time’, and krzyknięć ‘to have shouted out’/‘to have given a cry’. Note that in both examples just given, the empty prefix was z(a)-. This is not an accident — all verbs in Class 4 take z(a)- as their empty prefix (in Section 4.5 we investigate whether distinguishing z(a)- from other empty prefixes leads to a more fine-grained classification).

What is the temporal semantics of these verbs? We claim that class 4 verbs are what we call ‘unitisable processes’. We have chosen this name because we consider that the characteristic temporal property of such verbs is that they can be broken down into their ‘minimal instantiations’ or ‘minimal units’. But this leads to a question: the minimal unit of the eventuality is selected by the suffix -na-, the -na- suffix is usually called the semelfactive suffix, and the verbs formed with -na- are traditionally called semelfactive verbs (this comes from the Latin semel ‘once’ and facere ‘do’). So why didn’t we call class 4 verbs semelfactivising verbs?

Because the traditional terminology is too crude: ‘semelfactive’ emphasizes the singularity of the event (that is, the fact that it happened once). But the temporal semantics of class 3 verbs is more subtle than this. The key intuition about verbs in class 3 is that they can be broken down into temporally minimal units. With some verbs (the verbs traditionally called ‘frequentative’ verbs) this naturally leads to a ‘one time’ (that is, semelfactive) reading. But with other class 3 verbs it does not.

Let’s return to the two examples given above: both pukać ‘to be knocking’ and
krzyceć ‘to be shouting’ belong to class 4. The verb pukać is a typical example of the verbs called ‘frequentatives’ in the traditional Slavic literature (see for instance Isačenko (1962), Czochralski (1975)); ‘to be knocking’ can be thought of as describing a succession of continuously repeated individual (partial) eventualities. But this description is clearly inappropriate in case of verbs such as krzyceć ‘to be shouting’, a non-frequentative class 4 verb. However both verbs belong to class 4, and hence both select for the same three kinds of aspectual affixation. So let’s take a closer look at the temporal effects these aspectual modifications have, and at how the distinction between frequentatives and non-frequentative lexical meaning interacts with them.

The perfective verb formed with the empty prefix z(a)- is the most neutral of the three: it emphasizes neither the minimal instantiation of the event nor its duration — it simply says that the event finished. That is, zapukać ‘to have knocked’ and zakrzyceć ‘to have shouted’ simply say that the knocking and shouting events, respectively, finished; somebody knocked and shouted as much as he or she thought necessary, and this event was not interrupted.

On the other hand, the delimitative prefix po- stresses the duration of the event. The delimitative verbs popukać ‘to have knocked for some time’ and pokrzyceć ‘to have shouted for some time’ say that the described events not only ended but that they also lasted for a while.

And now for the verbs formed with the ‘semelfactive’ -na- suffix: pukać becomes puknąć and in this case the semelfactive translation ‘to have knocked once’ is accurate. However krzyceć ‘to be shouting’ becomes krzyknąć and this is better translated as ‘to have shouted out’ or ‘to have given a cry’. That is, this perfective verb signals that a brief shouting event took place. Clearly the difference in lexical meaning between frequentative and non-frequentative class 4 verbs is having an interpretational effect.

If a verb describes a series of events, reference to its minimal unit will naturally result in reference to one single subevent (the minimal unit of a knocking event is naturally understood to be a single knock). However if a verb does not describe an event consisting of series of small subevents, the reference to a minimal subevent is not so clearly defined; it will typically be understood to be an instance of an event of a brief duration.

The difference in lexical meaning between frequentative and non-frequentative class 4 verbs gives rise to some other semantic effects too. Let us look more carefully at the difference between forms with -na- and those with the empty prefix z(a)-. According to native speaker intuitions, these two forms can often be used interchangeably; the only difference between them lies in the emphasis of the minimality of the event in case of the suffixed form. For example, zapukać ‘to have knocked’ differs from puknąć ‘to have knocked once’ in that the suffixed form emphasizes the singularity of the event; zakrzyceć ‘to have shouted out’ differs from krzyknąć ‘to have shouted out’/’to have given a cry’ in that the latter emphasizes the fact that the event of shout-

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6There is a subtle intuition about some delimitative verb: when used with phrases such as ‘knock at the door’, it suggests that the door was not opened after all, so somebody was knocking at a door (a few times), but without the desired result; however, if it is not a knocking at the door but a knocking on a table (say while trying to fix it) the suggestion of a not-achieved result does not arise. Nor does it arise with verbs such as krzyceć ‘to shout’.
An Aspectual Classification of Polish Verbs

ing had a minimal duration. But since the minimal instantiation of a frequentative verb is exactly determined (it is one single knocking), and a typical knocking event consists of a series of such single knockings rather than of one single knocking, the difference between puknąć ‘to have knocked once’ and zapukać ‘to have knocked’ is likely to be more tangible than the difference between krzyknąć ‘to have shouted out’/’to have given a cry’ by zakrzyczeć ‘to have shouted’. And indeed, this seems to be the way Polish works: in virtually all contexts krzyknąć ‘to have shouted out’/’to have given a cry’ can be replaced by zakrzyczeć ‘to have shouted’, but replacing puknąć ‘to have knocked once’ by zapukać ‘to have knocked’ will typically require a specific context which makes it clear that the knocking event that is talked about does not (necessarily) consist of a series of small knockings.

The reader should now have a reasonable understanding of what we mean by unitifiable processes. To recapitulate, what is important for the temporal semantics of these verbs is not the fact that they can be instantiated once, but that they can be instantiated with minimal temporal duration (which for some verbs implies that it happened once). In case of a knocking event, the nature of the action naturally gives rise to the ‘do once’ (semelfactive) reading. But in the case of a shouting event, the minimal unit reading cannot be satisfactorily paraphrased with the ‘do once’ reading.

The reader may now like to think about the following list of class 4 verbs: tykać ‘to be ticking (clock)’, migać ‘to be indicating (car signals)’, machać ‘to be signaling (with your hand)’ or ‘to be waving’, mrugać ‘to be blinking’, kiwać ‘to be nodding’, pstrykać ‘to be flicking’, klikać ‘to be clicking’, trzepać ‘to be shaking (something)’, świastać ‘to be swishing (noise made by leaves, branches, etc.)’, szelesztać ‘to be rustling (discrete sound made by leaves, paper, etc.)’, szeleszczeć ‘to be rustling (continuous noise made by leaves, paper, etc.)’, błyskać ‘to be flashing’, trzepać ‘to be tooting (a horn)’, gdakać ‘to be clucking (sound made by hens)’, kwakać ‘to be quacking (sound made by ducks)’, kwikać ‘to be oinking (sound made by pigs)’, kraćać ‘to be cawing (sound made by magpies or crows)’, piszczeć ‘to be peeping (bird-like noise)’, skrzypieć ‘to be cracking (noise made by knuckles or other bone)’, chrupać ‘to be snoring’, chrząć ‘to be snotting’, chrząkać ‘to be clearing one’s throat’, tupać ‘to be stamping (one’s feet)’, trzaskać ‘to be slamming’, wzdychać ‘to be sighing’, chrupnąć ‘to be crunching’, kichać ‘to be sneezing’, dmuchać ‘to be blowing’, krzyceć ‘to be shouting’, gwizdać ‘to be whistling’, syceć ‘to be hissing’, and klaskać ‘to be clapping’.

Polish has some examples of class 4 verbs that come in both discrete and continuous versions, such as the two variants of the English verb ‘to rustle’ noted above. Another example (for which there seems to be no reasonable English equivalent) is the Polish verb sykać. This refers to the noise a snake makes when it is flicking its tongue in and out. But the English verb ‘to hiss’ does not translate this — hissing refers to the more continuous sound a snake can make, and Polish has a separate verb for hissing, namely syceć.
4.4.3 Class$^3$ verbs are culminating processes

Class$^3$ verbs can take an arbitrary empty prefix or the delimitative po-. For example, a verb such as pisać ‘to be writing’ can be prefixed by an empty prefix to form napisać ‘to finish writing’/‘to have written’, or by the prefix po- to form popisać ‘to have written for some time’.

We call class$^3$ verbs ‘culminating processes’. The terminology is taken from Moens and Steedman (1987, 1988). In the work of Moens and Steedman a culminating process verb denotes a process which, if not interrupted, will normally lead to a concrete result. Attaining the result typically takes some time; it is not an instantaneous process. The process leading up to the result can be viewed as a series of small changes that ultimately lead to a definitive change of state. The time where this happens is called the ‘culmination point’. If a process reaches its culmination point, it (so to speak) exhausts itself; it comes to an end, for it has reached its natural completion.

Before going further, however, one matter is worth emphasizing. Following Moens and Steedman (1987, 1988), we view the ‘culmination point’ as a temporal entity: it is the time that marks the completion of the process and the birth of the consequent state. Its temporal location need not be specified by the sentence, and there is no requirement that it be explicitly referred to. However, semantically, it has to be there — because the empty prefix (and every class$^3$ verb takes an empty prefix) asserts the attainment of the culmination point.

Why stress this point so heavily? Because some writers (notably, Verkuyl and Krifka) have analyzed the semantics of aspect in Germanic languages in terms which emphasize the role of the direct object, and then tried to extend their object-based analyses to Slavic languages such as Polish. Moreover, as an examination of their writing shows, when they attempt to transfer their approach to Polish, for the most part they consider class$^3$ verbs (Verkuyl in addition considers some class$^5$ verbs).

Now, the primary goal of this thesis is to argue that a verb-oriented perspective is needed to properly understand the Polish aspect system. So if we can make it clear just why a verb-oriented perspective is needed for class$^3$ verbs (the only class of verbs for which there is a noun-oriented rival) we shall have established our point.

Recall from previous chapters that Verkuyl and Krifka explain the difference between the English sentences *John wrote letters for an hour* and *John wrote a letter in an hour* in terms of the absence of a ‘culmination point’ for the first sentence: *Letters* denotes an unspecified quantity/is cumulative and so cannot limit the action. On the other hand *a letter* denotes a specified quantity/is quantized, so as soon as the letter is finished, the action is completed. Informally, we might say that in the theories of Verkuyl and Krifka, the direct object *a letter* acts as a sort of non-temporal counterpart to Moens and Steedman style culmination points, whereas the direct object *letters* cannot play this role. To put it another way, we might say that when it comes to aspectual issues, it is the “quantity” contributed by the direct object that plays the leading role — not the culmination time contributed by the verb.

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7Our account of class$^3$ verbs arose by trying to relate the classification to the ideas of Moens and Steedman. Interestingly, however, similar intuitions about the verbs that we classify as culminating processes have been expressed by traditional grammarians; see for example Boguslawski (1963).
But in Polish it doesn’t work this way: *either* sentence (with a quantificationally specified and unspecified direct object) can denote a completed or not-yet-completed action — it simply depends on whether the verb used in the sentence is perfective or imperfective. That is, in Polish we have four distinct possibilities: *Jan pisał listy przez godzinę* ‘Jan was writing letters for an hour’ (incomplete) versus *Jan napisał listy w godzinę* ‘John finished writing letters in an hour’ (complete), and *Jan pisał list przez godzinę* ‘Jan was writing (a) letter for an hour’ (incomplete) versus *Jan napisał list w godzinę* ‘John finished writing (a) letter in an hour’ (complete). Note that (like its English equivalent) the bare plural *listy* ‘letters’ is not definite and not specific; that there must have been a *certain* number of letters written *at the moment of evaluation*, can only be inferred from the information that at that particular moment the action was completed (the information that is contributed by the use of the empty prefix). But Polish speakers don’t need to know anything definite about the number of letters to understand the sentence *Jan napisał listy w godzinę* ‘John finished writing letters in an hour’ (complete). And given a temporal view of Polish aspect (and in particular if one thinks about the semantics of class 3 verbs in terms of Moens and Steedman’s (1987, 1988) temporal culmination point) it is obvious why this should be so: the sentence simply asserts that at a particular point of time (namely, the culmination point, which occurred one hour after the writing process started) an unspecified number of letters had been written. This is considerably simpler than the Verkuyl/Krifka account (which postulates that the function of the empty prefix in this case is to act like a determiner on the non-specific object position, thereby rendering it fit to act as a non-temporal correlate of Moens and Steedman style culmination points). Quite apart from anything else, it is hard to see how this story could be generalised to other verb classes. As we have seen, empty prefixes play a temporal role in the semantics of class 4 verbs; it seems simplest to conclude that they play a temporal role with class 3 verbs too.

Having made this point, let’s turn to the second formational option class 3 verbs allow, namely delimitative prefix *po-. In the complex verb *popisać* ‘to have written (for a while)’ the process of writing is not regarded as leading to any result, and the complex verb *popisać* does not denote a completed action. That is, delimitative *po-* can be thought of as restricting the duration of the process to a certain unspecified but delimited period of time (‘unspecific’, because nothing special marks the end of the period).

The Moens and Steedman temporal ontology gives us a natural way of thinking about this: the processes referred to by the delimitative verb is ‘stripped’ from its (potential) culmination point. Indeed, in the following chapter when we formalise this semantic discussion, we shall deal with class 3 verbs by devising a simple model-theoretic distinction between ‘stripped’ and ‘non-stripped’ culminating processes.

The reader should now have a reasonably clear understanding of what we mean by culminating process verbs. Here are some more examples: *pisać* ‘to be writing’, *czytać* ‘to be reading’, *śpiewać* ‘to be singing’, *budować* ‘to be building’, *komponować* ‘to be composing’, *tworzyć* ‘to be creating’, *gotować* ‘to be cooking’, *myć* ‘to be washing’, *prasować* ‘to be ironing’, *piec* ‘to be baking/to be roasting’, *smażyć* ‘to be frying’, *polerować* ‘to be polishing’, *jeść* ‘to be eating’, *pić* ‘to be drinking’, *czyścić* ‘to
4.4 Induced semantic distinctions

be cleaning’, sprzątać ‘to be tidying’, rekonstruować ‘to be reconstructing’, farbować ‘to be coloring’, gotować ‘to be boiling’, rżnąć ‘to be cutting/harvesting (with great power)’, and stroić ‘to be tuning/ornamenting’.

4.4.4 Class 2 verbs are processes

Class 2 verbs can only be made perfective by the delimitative prefix po-. For example, from siedzieć ‘to sit’ one can derive posiedzieć ‘to sit for a while’, from spacerować ‘to walk’ one can form pospacerować ‘to walk for a while’.

We call verbs belonging to class 2 ‘processes’. Our processes include what is traditionally called ‘processes’ or ‘activities’ (for example, ‘to work’, ‘to walk’, and so on). Both subclasses behave in exactly the same way under applications of aspectual formants. Incidentally, Parsons views agentive ‘to sit’, ‘to lie’, and so, as processes (Parsons, 1990, page 188).

Here are some examples: grać ‘to be playing’, myśleć ‘to be thinking, chichotać ‘to be giggling’, leżeć ‘to be lying’, lizać ‘to be licking’, spać ‘to be sleeping’, pływać ‘to be swimming’, tańczyć ‘to be dancing’, wspinać się ‘to be climbing’, stać ‘to be standing (agentive reading), dyskutować ‘to be discussing’, rozmawiać ‘to be talking’, plotkować ‘to be gossiping’, siedzieć ‘to be sitting’, całować ‘to be kissing’, chłonąć ‘to be absorbing’, ciągnąć ‘to be pulling’, cieknąć ‘to be leaking’, cisnąć ‘to be pressing’, grzęznąć ‘to be getting stuck (in mud), mknąć ‘to be running (poetic/literary), brnąć ‘to be wading’, and narzekać ‘to be complaining’.

4.4.5 Class 1 verbs are states or gradual transitions

Class 1 verbs are the most semantically varied of all. This class groups together two semantically quite distinct (though related) types of verb: states and gradual transitions.

State verbs

Many of the verbs in class 1 are state verbs. When state verbs are perfectivised by their empty prefix they become inchoative. That is, perfectivised state verbs refer to the beginning point of the state. For example, kochać ‘to be loving’ has as its twin pokochać ‘to have started to love’, rozumieć ‘to be understanding’ has as its twin zrozumieć ‘to have started to understand’, and wierzyć ‘to be believing’ has its twin uwierzyć ‘to have started to believe’. So the temporal semantics of state verbs is rather special. With class 4 and class 3 verbs empty prefixes denote the completion of the event (and indeed empty prefixes act this way with the class 1 verbs that are gradual transitions, as we shall soon see). But with state verbs, the empty prefix has precisely the opposite temporal effect.

Here is a list of class 1 state verbs: kochać ‘to be loving (someone/something), nienawidzić ‘to be hating’, wierzyć ‘to be believing’, ufać ‘to be trusting’, rozumieć ‘to be understanding’, martwić się ‘to be worrying’, weselić się ‘to be being joyful’, cieszyć się ‘to be being happy’, żałować ‘to be regretting’, lubić ‘to be liking’,
chorować ‘to be being sick’, szanować ‘to be respecting’, wielbić ‘to be worshiping’, czuć ‘to be feeling’, intrigować ‘to be intriguing someone’, dziwić ‘to be making someone intrigued/curious/surprised’, and podobać się ‘to be pleasing’.

Gradual transition verbs

The remaining verbs in class 1 are what we shall call gradual transitions. This subgroup is subject to an interesting formational regularity: gradual transitions are all made perfective by means of a single empty prefix, namely \( z(a) \)-. For example, grubnąć ‘to be growing fat’ under application of the empty prefix \( z \)- becomes zgrubnąć ‘to have become fat’, and perfectivising madrzeć ‘to be growing wise’ results in zmadrzec ‘to have become wise’. In Section 4.5 we examine the effect on our classification of distinguishing \( z(a) \)- from other empty prefixes.

But what about the semantics of gradual transitions? Dowty (1979) observes that a corresponding group of English verbs is closely related to analytic predicates of the type ‘get + comparative adjective’ (for example, get older, fatter, colder, and so on) (Dowty, 1979, page 88-90). Bertinetto and Squartini (1995) observe that the problem that these verbs pose can be reduced to the question whether the change they refer to is a matter of degree or whether it is something definite/ instantaneous/ indivisible (as in case of culminations) (Bertinetto and Squartini, 1995, page 13). On the basis of the Polish data we argue that neither of these two options is complete. Rather, the semantics of such verbs crucially involves both of these components as well as a third one: the reference to the (consequent) state.

Actually, gradual transition verbs are derived from descriptions of properties (recall from Chapter 1 that the Polish suffixes \(-e\)- and \(-na\)-, when used for word-formational purposes, are morphemes that derive verbs from adjectives and nouns). Intuitively, they can best be paraphrased as a gradual attainment of the state of having that property. We could describe gradual transition verbs as lexically referring to three temporal components: the consequent state, a series of gradual changes, and (by implication) a definite change (culmination point) that links the series of gradual changes with the consequent state. A gradual transition verb could be thought of as a morphological and semantic amalgam of culminating process, culmination and (consequent) state.

Like culminating processes, gradual transitions are imperfective: both refer to a process that gradually develops towards a culmination point. The attainment of the culmination point is asserted when culminating processes and gradual transitions are perfectivised by empty prefixes. However, in contrast to culminating processes, gradual transitions include the culmination point in their lexical meaning, and so they do not make it possible to refer to the process which lead up to it: if perfectivised they always assert the attainment of the culmination point. In terms of Moens and Steedman, a gradual transition does not make it possible to ‘strip’ the process from its culmination point (because the culmination point is incorporated by the verb’s lexical semantics). This is mirrored in the morphology: like culminations, gradual transitions do not combine with the delimitative po- - The growing fat process expressed by grubnąć ‘to be growing fat’, can be interrupted at any moment, and it will still have led (to some extent or other) to a consequent state of being fat, which is exactly what
is expressed when the perfective form of this verb, *zgrubnić* ‘to have become fat’, is used.\(^8\)

The three classes of culminating events are closely connected: if perfectivised they all become (or, can become) culminations. Yet, an imperfectivised culmination does not become a gradual transition, but culminating process. So the connection between gradual transitions and culminations is a one-way transition. Why is that? We think that the reason lies in the relationship that gradual transitions maintain with states. The state expresses a property. The change gradual transitions refer to is a change in a property, and a property may have different degrees. Consider once more the verb ‘to have become fat’: clearly, there are many degrees of being fat and which particular degree is achieved, and how, is highly context-dependent. To put it another way the ‘gradualness’ of gradual transitions seems to arise from their conceptually close affinity to states.

And indeed, the link between gradual transitions and states may go some way towards explaining what at first sight seems a semantic peculiarity of state verbs, namely that they have an inchoative reading when perfectivised by their empty prefix. The verb *grubnić* ‘to be growing fat’ refers to a state-changing process, a movement towards a culmination point. This culmination point simultaneously marks the end of the becoming-fat process, and the start of the being fat process. So perhaps the starting point of a state is the natural one to mark after all. And interestingly, some verbs are ambiguous between a gradual transition and a state interpretation: for instance, *zielenić się* ‘to be growing green’, or *czerwienić się* ‘to be turning red’. For instance, the Polish sentence *Pola zieleniła się* can be translated into English as ‘(The) fields are being green’, or as ‘(The) fields are becoming green’. The former reading is a state reading, and the latter reading is a gradual transition reading. The interpretation of the perfectivising operation depends on these two readings: *Pola zazieleniły się* can be translated as ‘(The) fields have started to be green’, or ‘(The) fields have become green’.

But this is speculation, and it is time to move on. Before doing so, here is a list of gradual transitions for the readers to think about: *mądrzeć* ‘to be growing wise’, *głupieć* ‘to be becoming stupid’, *chudnąć* ‘to be losing weight’, *grubnić* ‘to be growing fat’, *zielenieć* ‘to be growing green’, *czernieć* ‘to be becoming black’, *blednąć* ‘to be growing pale’, *starzeć się* ‘to be becoming old’, ‘to be aging’, *brzydnieć* ‘to be becoming ugly’, *czerwienić się* ‘to be turning red’, *zielenieć się* ‘to be growing green’, and *rumienić się* ‘to be blushing’.

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\(^8\)The incompatibility of gradual transitions with *po-* may also to a certain (but lesser) degree be conditioned by the fact that verbs belonging to this class are not agentive. The culmination point is not being reached through a persisting maintaining of the event — rather, it just happens to the experiencer. Hence, the oddness of *Jan skończył mądrzeć* ‘Jan finished growing wise’. Verbs formed with *po-* often have an overtone of agentivity.
4.5 Can we extend the classification?

We have seen that our formationally-driven classification of Polish verbs embodies considerable semantic content. But have we been fine-grained enough? Maybe it is possible to extend the classification further — and two directions for further exploration immediately suggest themselves. First, as we have just seen, our classification puts states and gradual transitions in the same group. Is it possible to extend the classification in a way that will tease them apart? Second, there is an obvious asymmetry in the classification: imperfective verbs are split into four classes, but the perfective verbs that are not formed by affixation from verbs in class 1 – class 4 are all lumped together in class 5 (culminations). Is there additional morphological structure within this class that carries interesting temporal information?

In this section we examine both issues. First we consider two (very different) attempts to distinguish states from gradual transitions. We then turn our attention to class 5. As we shall see, the formational possibility that we have called ‘morphonological change’ is a complex process. Nonetheless, as far as temporal information is concerned, it turns out to be semantically uniform.

4.5.1 Distinguishing states from gradual transitions

There is an obvious way of distinguishing states from gradual transitions. While the classification places them both in class 1 (that is, they are both perfectivised by empty prefixes) the temporal effect of their empty prefixes is completely different. In the case of states, perfectivisation yields an inchoative verb (that is, it signals the beginning of the state). With gradual transitions on the other hand, it signals the completion of the transition.

This means, of course, that we can distinguish states from gradual transitions by using a single semantic feature (let us call it inc) to signal whether or not the empty prefix has an inchoative effect or not. Doing this leads to the following table:

<table>
<thead>
<tr>
<th></th>
<th>ep(inc)</th>
<th>ep(-inc)</th>
<th>po-</th>
<th>-ng-</th>
<th>mpc</th>
</tr>
</thead>
<tbody>
<tr>
<td>state</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gradual transition</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>process</td>
<td></td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>culminating process</td>
<td>yes</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>unitisable process</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>culmination</td>
<td></td>
<td></td>
<td></td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

It is straightforward to capture this extension in Prolog. First, recall our previous rule for states/gradual transitions:

\[
\text{state_or_gradual_transition}(X) :\text{formant}(X, \text{ep}(_), \text{po}-, \text{-ng-}, \text{mpc}).
\]

Next, let us mark in the lexicon those verbs which have an inchoative reading when perfectivised by their empty prefix. In our toy lexicon, this means adding the following information:
4.5 Can we extend the classification?

\begin{verbatim}
ep_inc(kochac).
ep_inc(rozumiec).
ep_inc(ufac).
ep_inc(wierzyc).
\end{verbatim}

With this information at our disposal, we split states and gradual transitions apart as follows:

\begin{verbatim}
state(X) :- formant(X, ep(_), -po, -na, -mpc),
          ep_inc(X).
gradual_transition(X) :- formant(X, ep(z(a)), -po, -na, -mpc),
                      \+(ep_inc(X)).
\end{verbatim}

The first rule says that a verb is a state if it has the formational properties of a class1 verb, and has an inchoative reading when perfectivised by its empty prefix. The second rule says that a verb is a gradual transition if it has the formational properties of a class1 verb, and does not have an inchoative reading when perfectivised by its empty prefix (note the use of \+, Prolog’s inbuilt negation-as-failure, to formulate the latter constraint).

This works correctly. Posing the query

?- state(V).

extracts all the state verbs (that is, kochac, rozumiec, ufac, and wierzyc), and posing the query

?- gradual_transition(V).

extracts all the gradual transition verbs (that is, blednac, ciemniece, grubnac, and madrzc).

This is pleasant: the original classification does most of the work for us, and then we capture the required change with single addition. Moreover, the distinction between class1 verbs that receive an inchoative reading when perfectivised and those that do not is a relatively robust distinction: while some semantic distinctions are fuzzy, this one is clear.

Nonetheless, note that the resulting classification can no longer be called formationally driven. The distinctions drawn in our original table were established by appealing to essentially formal criteria (the secondary imperfectivisation and secondary perfectivisation tests). Because of this we could claim that the semantic distinctions discussed in the previous sections were induced, not imposed. But we cannot say the same thing about the inc-based distinction we have just drawn between states and gradual transitions. No formal morphological test underpins this distinctions: it is based on a purely semantic decision, namely whether or not a class1 verb has an inchoative reading when perfectivised by its empty prefix. To put it another way, we imposed this distinction. We are here drawing a Vendler-style distinction in the traditional (semantic) way. There is nothing wrong with doing this (in fact, we think it is the probably sensible way to proceed in this case) but it is important to be aware that this is what we are doing.

Given this, it is interesting to try again. Is it possible to distinguish states from gradual transitions in a manner more in keeping with our original classification —
that is, in terms of formational transformations licensed by the secondary imperfectivisation test? As we shall now see we come tantalizingly close to doing precisely this.

The key observation was made in the previous section: gradual transitions always take \(z(a)\)- as their empty prefix. Now, the \(z(a)\)- prefix is rather special: it is the prefix very often used as an empty prefix in Polish (and accordingly it is more grammaticalized than any other empty prefix). Moreover, as Bogusławski notes, it is hard to ascribe to this prefix any ‘individual’ (that is, lexical) meaning; all its uses seem to be genuinely ‘empty’ (Bogusławski, 1960, page 105). So: what happens if we distinguish \(z(a)\)- from other empty prefixes? We obtain the following table:

<table>
<thead>
<tr>
<th></th>
<th>ep (not (z(a))-)</th>
<th>(z(a))-</th>
<th>po-</th>
<th>-tg-</th>
<th>mpc</th>
</tr>
</thead>
<tbody>
<tr>
<td>state</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gradual transition</td>
<td></td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>process</td>
<td></td>
<td></td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>culminating process</td>
<td>+</td>
<td>+</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unitisable process</td>
<td></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>culmination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yes</td>
</tr>
</tbody>
</table>

The first things to note about this table are rows 2 and 4. Row 2 records the fact that (as we just mentioned) gradual transitions always use \(z(a)\)- as the empty prefix. And now note row 4: this records the fact (also noted in the previous section) that unitisable processes are subject to the same formational regularity. To put it another way, what this table shows is that only two classes of verbs in Polish are allowed to vary with respect to the empty prefixes they can take, namely states verbs and culminating process verbs.

The next thing to notice are the occurrences of ‘+’ in the table. These are used to indicate that states and culminating processes can take either arbitrary empty prefixes or \(z(a)\)-. That is, whereas the ‘yes’ used in the other rows is conjunctive, ‘+’ is disjunctive.

The table suggests that \(z(a)\)- may play some role in distinguishing states from gradual transitions. But it is important to note that the table is not a classification of Polish verbs in the strong sense used earlier. That is, this table does not have the same status as our original classification. Why not? Because, unlike our original classification, it does not provide necessary and sufficient conditions strong enough to assign each Polish verb (to which it applies) to a unique class. It is a classification of Polish verbs, but a weaker one.

To see why, note that the (disjunctive) information given in row 1 of the table is not strong enough to distinguish states from gradual transitions. For example, suppose we are given a gradual process verb (for example grubnąć ‘to be growing fat’) or a state verb that takes \(z(a)\)- as an empty prefix (for example rozumieć ‘to understand’). All that the information in the table lets us conclude is that both verbs are either state verbs or gradual transition verbs. Of course, in some cases the table does let us do more. For example, if we are given a verb like wierzyć ‘to believe’ (a state verb that
4.5 Can we extend the classification?

takes $u$- as its empty prefix) the disjunctive information given in row 1 does do some extra work for us, and correctly classifies this verb as a state.

We can make the point more vividly by examining the Prolog corresponding to this table. The required Prolog code is simplicity itself to write: to distinguish the effect of $z(a)$- from other empty prefixes, we only need to make two small changes. First, we replace our previous rule for unitisable processes; that is, we replace

$$\text{unitisable_process}(X) :- \text{formant}(X, \text{ep}(\_), \text{po}, \text{na}, -\text{mpc}).$$

by the following variant:

$$\text{unitisable_process}(X) :- \text{formant}(X, \text{ep}(z(a)), \text{po}, \text{na}, -\text{mpc}).$$

Note that $\text{ep}(\_)$ has been replaced by $\text{ep}(z(a))$; that is, the new rule insists that the only allowable empty prefix is $z(a)$.

In a similar vein, we replace the rule

$$\text{state_or_gradual_transition}(X) :- \text{formant}(X, \text{ep}(\_), -\text{po}, -\text{na}, -\text{mpc}).$$

by the following two rules

$$\text{state}(X) :- \text{formant}(X, \text{ep}(\_), -\text{po}, -\text{na}, -\text{mpc}).$$
$$\text{gradual_transition}(X) :- \text{formant}(X, \text{ep}(z(a)), -\text{po}, -\text{na}, -\text{mpc}).$$

Note that in the rule for gradual transitions we insist that the only allowable empty prefix is $z(a)$-.

So far so good — these changes obviously capture the effect of the previous table. But it should be clear that these rules are not strong enough to tease states and gradual transitions apart. For a start, note that any verb which satisfies the criteria demanded of gradual transitions automatically satisfies the criteria demanded of gradual transitions — after all, $\text{ep}(z(a))$ is just a special case of $\text{ep}(\_)$. Thus posing the query

$$?- \text{state}(V).$$

will still extract all the class1 verbs, the gradual transitions included. Furthermore, note that any state verb which takes $z(a)$- as an empty prefix also satisfies the criteria demanded of gradual transitions. Thus posing the query

$$?- \text{gradual_transition}(V).$$

extracts not only all the gradual transitions in our toy lexicon (namely blednac, ciemniewc, grubnac, and madrzec), but also two state verbs (namely rozumiec and ufac).

Of course (as we mentioned when discussing the table) in some cases distinguishing $z(a)$- from other empty prefixes does yield more information. For example, consider the following two queries:

$$?- \text{state}(wierzyc).$$

Yes

$$?- \text{gradual_transition}(wierzyc).$$

No
That is, the program correctly concludes that wierzyć is a state and not a gradual transition verb. (A similar dialogue establishes the same for kochać.)

So it is clear that isolating z(a)- from the other empty prefixes does not provide a formal basis for fully distinguishing states form gradual transitions. Nonetheless, as we said before, it comes tantalizingly close. The only verbs which spoil this regularity are states verbs which take z(a)- — and in fact, we have only been able to find a few such verbs. It would be interesting to do some further corpora-based work here to determine exactly which Polish verbs are exceptions to the regularity just noted.

4.5.2 Morphonological change in Polish

In our classification, all basic perfective verbs are lumped together in class 5 (that is, culminations). Should we rest content with this, or is there additional morphological structure here that carries semantic import?

This is an important question to examine. Many writers on the subject treat what we have called morphonological change as if it were morphologically simple and uniform; indeed, some write as if insertion of the -yw- suffix is all that is involved. As we shall see, however, morphonological change is a more complex process than that. Moreover, such changes can have semantic import; for example, we noted in Section 4.2 that adding a -yw- suffix to pisać 'to (be) writ(ing)' yields the iterative/habitual verb pisywać 'to write from time to time/have a habit of writing'. All of this adds force to the question we have just posed: does any of this additional morphological here carry semantic import of relevance to our classification?

Recall that ‘morphonological change’ is Czochralski-inspired terminology. What exactly does it cover? Synchronically, the process can be analyzed into four components: we call these components vowel insertion, vowel change, suffix insertion and suffix change. Let us now define these terms. We first observe that Polish infinitives generally end with -ć, and the few that do not end in its phonological variant c. Then:

- If an a is added before the infinitive ending (ć or c), and no other change is made to the (perfective) infinitive, we talk of vowel insertion.
- If the last vowel of the infinitive is changed to a, we talk of vowel change.
- If the infinitive ends with ‘vowel c’ or ‘vowel vowel c’ and we replace the vowel sequence by a unit of the form ‘(vowel)consonant a’ we talk of suffix insertion. Here the brackets around vowel means that the added vowel is optional. The consonant used is mostly a w, but it can also be g, j, k m, n, or t; the vowel (if one is added) will be either a, e, o, i, or y).
- If the infinitive ends with -nqcć, and we replace the n by some string (including the empty string) we talk of suffix change. In fact, there are only eight possible replacements strings in Polish (the empty string is one of them) and these are listed in the table below. We remark that -nq is a suffix, but in case of verbs that undergo morphonological change it is a word-formational, not an aspectual morpheme.
These four cases cover all the regular changes, but for the sake of non-Polish speakers we should mention that vowel and suffix change or insertion can also be accompanied by irregular consonant change and vowel change within the root of the infinitive. It is not worthwhile listing all the possibilities here, but it’s worth knowing that as a rule, it is the vowel in the last stem syllable that undergoes a change. In particular, it is the vowel o (and sometimes the o’ that developed from o) of the perfective stem that is replaced by a. For more information, see (Czochralski, 1975, page 85).

The regular morphological and phonological alternations between perfective and imperfective verbs are given in the following table, which is based on the results of Czochralski’s investigations of Polish verbs. The final line of the table lists all eight possible strings that can enter in suffix replacement.

<table>
<thead>
<tr>
<th>perfective ending</th>
<th>imperfective ending</th>
</tr>
</thead>
<tbody>
<tr>
<td>´c</td>
<td>wać, ać</td>
</tr>
<tr>
<td>ić</td>
<td>ać, ować</td>
</tr>
<tr>
<td>yć</td>
<td>ać, ywać, iwać</td>
</tr>
<tr>
<td>ać</td>
<td>ywać, iwać, awać, ewać</td>
</tr>
<tr>
<td>ać</td>
<td>ywać, inać, ynać, ymać</td>
</tr>
<tr>
<td>eć</td>
<td>ać, ywać, ewać</td>
</tr>
<tr>
<td>oić</td>
<td>ajać</td>
</tr>
<tr>
<td>ać</td>
<td>ajać</td>
</tr>
<tr>
<td>eći</td>
<td>ejać</td>
</tr>
<tr>
<td>ec</td>
<td>ekać, egać</td>
</tr>
<tr>
<td>och</td>
<td>agać</td>
</tr>
<tr>
<td>ać</td>
<td>ać, wać, ywać, iwać, kiwać, tywać, tać, jać</td>
</tr>
</tbody>
</table>

The next table gives some concrete examples of these morphonological changes in action. If there are two examples given of an alternation type, the first is a regular example, and the second is an example accompanied by additional vowel and/or consonant changes within the root (that is, it is an irregular example). There are far fewer morphologically simple than complex verbs that undergo morphonological alternations (by “morphologically complex” verbs we mean verbs prefixised by a lexical prefix). So if an alternation is illustrated with a prefixed verb only, it means that there are no simple verbs that do undergo that particular morphonological change.
## Alternation

<table>
<thead>
<tr>
<th>Alternation</th>
<th>Polish example</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>dać-dawać</td>
<td>to give</td>
<td></td>
</tr>
<tr>
<td>(1) skupić-skupiać</td>
<td>(1) to buy (back)/ to concentrate;</td>
<td></td>
</tr>
<tr>
<td>(2) zabawić-zabawiać</td>
<td>(2) to entertain</td>
<td></td>
</tr>
<tr>
<td>rzucić-rzucać;</td>
<td>(1) to throw;</td>
<td></td>
</tr>
<tr>
<td>(2) rozwijać—rozwijać</td>
<td>(2) to come back to buy</td>
<td></td>
</tr>
<tr>
<td>kupić-kupować</td>
<td>(1) to buy</td>
<td></td>
</tr>
<tr>
<td>(1) zwiciężyć-zwyciężać;</td>
<td>(1) to win a victory</td>
<td></td>
</tr>
<tr>
<td>(2) stworzyć-stwarzać</td>
<td>(2) to create</td>
<td></td>
</tr>
<tr>
<td>(2) dobyć-dobywać**;</td>
<td>(1) to reach out for something</td>
<td></td>
</tr>
<tr>
<td>(2) rozpatrzzyć—rozpatrywać</td>
<td>(2) to consider jump in</td>
<td></td>
</tr>
<tr>
<td>zkłócza—zklóczać;</td>
<td>to neglect</td>
<td></td>
</tr>
<tr>
<td>podścina—podściniać;</td>
<td>to overhear, to eavesdrop</td>
<td></td>
</tr>
<tr>
<td>przeklina—przekliniać</td>
<td>to rise from the dead</td>
<td></td>
</tr>
<tr>
<td>nadzię—nadziewać</td>
<td>to impale, to skewer, to stuff</td>
<td></td>
</tr>
<tr>
<td>spoczyna—spoczywać</td>
<td>to take a seat, to rest</td>
<td></td>
</tr>
<tr>
<td>przecina—przecinać</td>
<td>to cut through</td>
<td></td>
</tr>
<tr>
<td>zaczyna—zaczywać</td>
<td>to begin</td>
<td></td>
</tr>
<tr>
<td>nadyma—nadymać</td>
<td>to puff out</td>
<td></td>
</tr>
<tr>
<td>przędza—przędzać</td>
<td>to foreseee</td>
<td></td>
</tr>
<tr>
<td>przepięca—przepięcać</td>
<td>to see through</td>
<td></td>
</tr>
<tr>
<td>spostrzega—spostrzegać</td>
<td>to notice</td>
<td></td>
</tr>
<tr>
<td>przemoc-przemagać</td>
<td>to overcome</td>
<td></td>
</tr>
<tr>
<td>przysięga—przysięgać</td>
<td>to swear</td>
<td></td>
</tr>
<tr>
<td>wybuchać—wybuchać;</td>
<td>(1) to explode;</td>
<td></td>
</tr>
<tr>
<td>wchłonąć—wchłaniać</td>
<td>(2) to absorb</td>
<td></td>
</tr>
<tr>
<td>odfrunąć—odfruwać</td>
<td>to fly away</td>
<td></td>
</tr>
<tr>
<td>nagłada—nagładywać</td>
<td>to pester sb for sth</td>
<td></td>
</tr>
<tr>
<td>wstrzyknąć—wstrzykiwać</td>
<td>to inject</td>
<td></td>
</tr>
<tr>
<td>rozbijać—rozbiłkiwać</td>
<td>to flash out</td>
<td></td>
</tr>
<tr>
<td>nadepnąć—nadeptywać</td>
<td>to step (on sb's foot)</td>
<td></td>
</tr>
<tr>
<td>dorosnąć—dorastać</td>
<td>to grow up</td>
<td></td>
</tr>
<tr>
<td>mięć-miać</td>
<td>to pass</td>
<td></td>
</tr>
</tbody>
</table>

The *’* marks alternations that are very exceptional and include up to five simple verbs/bounded morphemes; ***'*** covers up to 15 simple verbs/bounded morphemes undergoing a particular derivation. The '!*’ means that only one simple verb or one bound morpheme undergoes the particular alternation.

Clearly there is a lot more to deriving an imperfective form from a basic perfective form than simply inserting -yw-. Moreover, the morphological operations noted in the above table have other semantic effects in Polish besides imperfectivising perfective verbs; in particular, they can also be used to form iterative/habitual verbs. In spite of this, none of this additional morphological structure is relevant to our aspectual classification of Polish verbs. Why not?

Morphonological change ‘feels’ like a uniform process to Polish native speakers. When forming imperfective verbs out of perfective verbs, native speakers are not usually aware of what exactly it is that they are changing — for example, whether the change does or does not involve a consonant.
Now, this feeling might well be mistaken, and it is clear that we cannot regard it as sufficient evidence to let us conclude that there is no further aspectually relevant distinctions to be drawn within class 5. But an inspection of the data supports these intuitions. Whether we compare verbs that make use of vowel change with verbs that make use of vowel insertion, or verbs that make use of suffix change with verbs that make use of suffix insertion, nothing seems to have any effect: there is no evidence that the fine structure of morphonological supports any semantic distinctions. The choices native speakers instinctively make between vowel change/insertion and suffix change/insertion seem purely phonologically constrained.

We draw the following conclusion. The details of Polish morphonological change are indeed complex. Nonetheless, there is nothing to be gained by drawing more fine-grained morphological distinctions within in class 5.

4.6 Summary

Let us summarise what we have done in this chapter. We isolated four formational operations, and classified Polish verbs into five classes on the basis of the formants they select for. We isolated these particular operations because they are the operations that give rise to aspectual pairs in Polish. Our concept of ‘aspectual pair’ was essentially formal, not semantic: it was defined in terms of the secondary perfectivisation and imperfectivisation tests. In spite of this, our formationally driven classification induced interesting temporal distinctions on Polish verbs. In fact, we argued that the five formationally defined classes give rise to what we called (drawing on Moens and Steedman terminology) culminations, unitisable processes, culminating processes, processes, and states/gradual transitions. We then investigated the possibility of inducing further formationally driven distinctions on class 5 Polish verbs. We noted that the z(a)-prefix gave us a partial grip on the distinction between states and gradual transitions. Further, we concluded that the class 5 verbs (culminations) could not be semantically subdivided by making use of the fine structure of morphonological change.
An Aspectual Classification of Polish Verbs