Manual for Phonology Pad

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Contents

1.   About PhonologyPad

PhonologyPad is a program intended to assist in finding correct solutions to classical phonology problems. By "classical phonology problems," I mean problems in which the data consist of a paradigm involving phonological alternations. The student must set up appropriate underlying representations, then use a rule editor to formulate an ordered sequences of formal phonological rules. Phonology Pad applies the rules to the underlying representations and compares the output to the actual forms. Where the analysis works, PhonologyPad informs the

user. Where the analysis does not work, PhonologyPad provides diagnostics, in particular the phonological derivation (correct or otherwise) for any form requested by the user.

PhonologyPad interacts with another program called FeaturePad, available from the same source. When rules are being formulated, it can call up FeaturePad and import natural classes (as defined by sets of feature values), incorporating them into rules.

PhonologyPad was programmed by Daniel Albro, a graduate student in the UCLA Department of Linguistics.

2. Philosophy

PhonologyPad is meant to foster active learning by allowing the student to develop hypotheses and explore their consequences. It is also meant to foster rigor by carrying out the tedious work of checking solutions, and insisting that solutions work completely.

3. Accessing PhonologyPad

PhonologyPad may be downloaded from that part of Bruce Hayes's UCLA Web site that deals with the course Linguistics 120A "Phonology I". The Web address is **www.humnet.ucla.edu/humnet/linguistics/people/hayes/120A/**. Directions for installing the software are at the Web site, but are also repeated immediately below.

Phonology Pad is also installed in the Linguistics Department Computer Room machines in 3103C Campbell.

3.1. Downloading and Installation

PhonologyPad may be freely downloaded by all. However, it is copyrighted by the Regents of the University of California and may not be used for any commercial purpose.

You need Windows 95 or higher to run PhonologyPad. Unfortunately, there is no Mac version.

To get PhonologyPad running, you need to do five things:

- It is recommended that you download and install FeaturePad first. See the Web site for instructions on how to do this. (Or follow the directions below, which apply to FeaturePad as well.)
- Download PhonologyPad
- Uncompress PhonologyPad
- Install PhonologyPad
- Start it

1.1.1.   **To** download **PhonologyPad:**

Use your Web browser to download the file that contains the program (the place where you should click to download is clearly shown at the Web site). The file you will download is a self-unpackaging compressed file called **PPSetup.exe**[1]). When you download it, tell your browser to put it in your Downloads folder.   If you don't already have a Downloads folder, there is a link at the Web site that will tell you how.

1.1.2.   **To** uncompress **PhonologyPad**

Click on **My Computer**, then **C:,**[2] then **Downloads**. Once you're in **Downloads**, double-click on **PPSetup.exe**, and the files will be unpacked. It may take a second for all the newly unpacked files to make their appearance in the **Downloads** folder; be patient.

1.1.3.   **To** install **PhonologyPad:**

Look through all those files that just got unpacked, and find the file called **setup.exe.** Double-click on it, then follow the instructions to get a standard Windows installation. Please don't be creative; install the program exactly where Windows suggests.

Once you've installed PhonologyPad, you can delete everything that was in the **Downloads** folder (**Ctr a, Files, Delete, Yes, Yes to All**), so it will be empty for your next download.

4.   **Starting Phonology Pad**

4.1.   **From your own computer:**

Click on Start, hold down the mouse button, then select Programs, then PhonologyPad.

For convenience, you may wish to make a shortcut: Click on **MyComputer**, then **C:**, then **Program Files**, then **PhonologyPad**, then click on **PhonologyPad.exe** and drag to the desktop.

5.   **Opening a Problem Set**

Once you've started PhonologyPad, then you need to find the problem set you're going to work on.

Some of the problems are installed in the PhonologyPad directory. To open one of these, all you have to do is click on **File**, then **Open Problem Set (1st time)**, then **ProblemSetName.ast**.

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[1] If your computer is not configured in a certain way, you will not see the suffix .exe, but just PPSetup. This is not crucial. However, the Web page provides a link (http://www.linguistics.ucla.edu/people/hayes/120a/exe.htm) that will tell you how to make .exe and other suffixes visible.

[2] The "C:" may appear with other words, such as the name of the computer manufacturer.

Sometimes, problems are given out on floppy disk. Put the floppy in the floppy drive and start PhonologyPad. Click on **File**, then **Open Problem Set (1st time)**. Then keep clicking on the folder icon with the little angled arrow on it. Once you see **My Computer** in the "Look in" window, click on **3 1/2 Floppy (A:)**. Then look through the folders on the floppy to find **ProblemSetName.ast**. Double click on **ProblemSetName.ast** to open your problem.

6. Entering Underlying Representations

Enter underlying representations for the stems and for any affixes present.

6.1. Underlying Representations for Stems

Underlying representations for stems are entered in the white spaces occupying the *column* labeled **UR**; underlying representations for affixes are entered in the white spaces occupying the *row* labeled **UR**.

You can simply type the underlying representations for stem in the box provided. But when there are phonetic symbols present, it's usually easier to copy the underlying representations from one of the data cells, then if necessary edit the result. You can copy a whole data cell by clicking on it once, then typing **Ctrl c**. Paste the result into the underlying representation column by click on the target cell, then typing **Ctrl v**.

You can copy just *part* of a cell by double-clicking, selecting what you want, then using **Ctrl c** and **Ctrl v** to copy that bit.

6.2. Underlying Representations for Affixes

Underlying representations for affixes are entered into a pop-up window, called **Affix Order**. This window pops up whenever you double click on the white cell for the underlying representation of an affix (from the row labeled **UR**). You can specify first prefix, second prefix, first suffix, and second suffix. As with the underlying representations for stems, you can copy the crucial material from the cells of the paradigm.

7. Multiple Paradigms

Sometimes a problem set has just one paradigm; sometimes it has several. To finish a problem, you have to provide underlying representations and rules for each paradigm.

To go back and forth between paradigms, click the **Next Paradigm** and **Previous Paradigm** buttons on the top right corner of the screen.

When the program checks the rules you have proposed, it will automatically check the data of every paradigm.

8.   Editing Rules

Next, click on **Edit Rules** button (brings up the **Overall View of Rules** window), then the **Create Rule** button (brings up the **Phonological Rule** window). Use the buttons in the **Phonological Rule** window to create rule that will derive the correct output forms.   Be sure to include a name for each rule in the Rule Name box.

To test a rule or set of rules, get out of the **Phonological Rule** window and the **Edit Rules** windows by clicking on OK, so you're back in the Main window. Then, click on the **Apply Rules** button. You will know when you have succeeded because the forms will all light up in green, and a cheerful congratulatory message will appear.

If your rules go wrong, the forms where they don't work will light up in red. You can click on a form to see its derivation in detail, in order to figure out how to change your rules.

8.1. Features in Rules

When you're editing rule, you will often need features. There are two ways to enter them in your rules.

1.1.4.   Editing Features within PhonologyPad

Click on the feature matrix button in the **Phonological Rule** window.   This will install an empty feature matrix in your rule. Double-click on this empty feature matrix, and little menus will pop up that let you put in +, -, and any feature name. Click on empty space in the Phonological Rule window, and your new features will appear in the matrix.

1.1.5.   Editing Features by Launching FeaturePad

Phonology Pad lets you call up FeaturePad and use it to find appropriate combinations of features. While you are in the **Phonological Rule** window, click on the **Launch FeaturePad** button.

The program may at this point may ask you to find FeaturePad. If FeaturePad has been installed in Program Files, then this should not be hard: click on the "suitcase" icon with the upward pointing arrow. Then click on **FeaturePad**, then on **FeaturePad.exe**. In general, you can expect FeaturePad to be installed in a similar location on a computer as PhonologyPad.

Once you're in FeaturePad, click on **xxx.inv**, where **xxx** is the name of the language of your problem set.[3]   Work out a rule that does what you want—note that FeaturePad lets you try out changes as well as natural classes; use the option under **Perform a Feature Change**. Once you have the natural classes and changes you want, click on the feature bundles you selected, holding

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[3] If there is no such file, you can use FeaturePad to create one. Click on any language, just to get into the program, then click on the Phonemes menu, and select **Create a New Phoneme Inventory**. Follow instructions from there. The new phoneme inventory may be saved from the File menu.

the mouse button down, and drag the result into the appropriate spot on the **Phonological Rule** window of Phonology Pad. A feature matrix will appear with the features you selected.

1.1.6.   Advanced Feature Options

If you edit your features within PhonologyPad (see 1.1.4 above), a few more advanced options are available.

- You can use the Greek letter variables α and β. If you put an α in a rule (either side of the arrow), you get in effect two rules: one in which α is replaced by the value +, the other in which α is replaced by the value -. β works just like α, and you can use both in the same rule.
- You can use -α and -β. These stand for the opposite value of α and β appearing elsewhere in the rule.
- You can specify 0, which designates the value for a feature that the segment "doesn't care" about; for example, backness in English velars. I recommend against using this, however.

8.2. Phonetic Symbols in Rules

To insert a **phonetic symbol** into a rule, click on the button that looks like $\boxed{\eta}$. You can type ordinary Roman-letter symbols; others are most easily pasted in (go back to the data, double click on a cell, select the symbol, press **Ctrl c**, go back to the rule, and press **Ctrl v**).

8.3. Numerical Subscripts

For cases of complete assimilation or metathesis, you need to number the terms of the rule. For example, the /n/ Assimilation rule found in Toba Batak is:

n   [-syllabic] →
1   2   2   2

This makes /n/ a perfect copy of any immediately following consonant.

To edit this rule, you would first put in n and [-syllabic]. Then you click on n and then the button that looks like $\boxed{1}$. This will number the items on the left side of the arrow.

To number items on the right side of the arrow, first click where you want the number to go, then click on $\boxed{1}$, then type in the pop-up window the number you want.

8.4. Deleting Material in Rules

To delete one term of a rule (such as a feature matrix, or C_0, etc., click on that term and press the **Del** key. You can also click to put the cursor immediately after the term you want to delete, and then press the **Backspace** key.

8.5. Rule Ordering

To check rule ordering, you can go into the **Overall View of Rules** window (from the main window, click on **Edit Rules**; from the Phonological Rule window, click **OK** or **Cancel**) and then drag rules up or down to change the ordering.

This is a good way to test that a particular ordering is needed: try changing the ordering and see what goes wrong. You can click on the red forms and print out the bad derivations, for purposes of illustrating the necessary ordering in your write-up.

8.6. The C_0 Button

This button, part of the Phonological Rule window, lets you insert two kinds of things: abbreviations, and variables.

1.1.7. Abbreviations

The two abbreviations are:

C = [-syllabic], a consonant
V = [+syllabic], a vowel

1.1.8. Variables

The variables are:

C_0 = any number of consonants, *including zero.*
V_0 = any number of vowels, *including zero.*
X = any number of segments

Here is an important caution about using variables: at present, you must use them *only in between other terms in a rule*, or else you will cause PhonologyPad to crash. This will be fixed in the next version.

You might note, however, that whenever you put C_0, V_0, or X at the edge of a rule environment, it will not help your rule at all. Since these symbols can match up to the null string, and since rules don't have to "match with" the entire word, such a rule would apply to exactly the same forms, in exactly the same way, as a rule that doesn't have C_0, V_0, or X. It is probably for this reason that the programmer did not notice the problem.

9. Rule Diagnosis

When your rules work, click on one of the red cells showing data where it fails. This will give you a phonological derivation.

To see the full details of what went wrong, click on any line of a derivation. PhonologyPad will then show you the full details of the representation, with every feature of every segment, and all boundaries present. It will also let you call up FeaturePad to compare the features of what you derived with the features of what you actually want.

10. Saving your Work

FeaturePad will prompt you every ten minutes to save your work. Your answer is saved in a separate file, which will have the file suffix **.pst**. The first time you save, you should type a new file name for your answer, something like **YourNameLanguageName.pst**. Be sure to give .pst as the suffix name—this is the suffix used for PhonologyPad solutions. Save your solution file in a location that you can safely get at; for example, a floppy disk, or an easily-remembered location on the hard disk of the computer you are using.

11. Printing Out Your Results

To print, select the File menu, then Print, then All. Under "Rule Selection", select "one rule per page."

12. A Suggested Strategy for Using Feature Pad

I strongly recommend that you develop your solution **gradually**, testing it at every stage as you develop it. There are two ways to do this:

12.1. Starting with No Rules

Enter your proposed underlying representations. Then, before you have constructed any rules, click on the **Apply Rules** button. This will show you the forms that need to have some rule in order to be derived correctly. Formulate your first rule, and click on **Apply Rules** again. Check the results, and revise your rules and underlying forms if necessary. Continue in this manner until you have a solution that works for all forms.

12.2. Doing a Few Representations at a Time

A more extended version of the above method is to enter only a few underlying representations at a time, and following the same method. Here, you gradually add new forms and new rules, going back and forth between the two.

13. Writing Up your Results

This section goes beyond how to use the software to the more general issue of how to do a problem set in PhonologyPad.

Most phonology teachers (myself included) feel that just finding a working solution is not an adequate answer for a phonology problem. There should also be a clear writeup. You want to produce a coherent account of your analysis, explaining your rules in words. You should explain how you picked your underlying representations, how the rules work, and why they must be ordered the way they are.

In any writeup, an important principle is not to dump all the rules in one place; not to dump all the derivations in one place, but rather place them at strategic locations in the written discussion, where they will properly illustrate the point being made.

At present, it is possible to do this only by rather crude means. That is, if you select the option to print each rule on a separate page, you will have sheets of paper that you can (physically) insert at the appropriate places in your write-up. You should add cross references from your text to the PhonologyPad printout (for example: "The rule of Metathesis, as I formalized it in PhonologyPad, is given on the next page"; or "as we can see from the derivation on the next page, ...").

14. Problems; Crashes; Feedback

Feedback on PhonologyPad (bug reports, suggestions for improvement) is welcome. Address comments to Bruce Hayes at bhayes@humnet.ucla.edu. In making comments about bugs/crashes, it will help if you copy down the exact words of the error message that appeared when the program crashed. It will also help if you attach to your e-mail message a copy of your .pst file.