

Creating Medical Pedigree with PSTricks and L^AT_EX. *

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Abstract

A set of macros based on **PSTricks** to draw medical pedigrees according to the recommendations for standardized human pedigree nomenclature. The drawing commands place the symbols on a **pspicture** canvas. An interface for making trees is also provided. The package can be used both with L^AT_EX and PLAIN T_EX. A separate **Perl** program for generating T_EX files from spreadsheets is provided elsewhere on **CTAN**.

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1 User Guide

1.1 Introduction

Medical pedigree is a very important tool for clinicians, genetic researchers and educators. As stated in [1], “The construction of an accurate family pedigree is a fundamental component of a clinical genetic evaluation and of human genetic research.” Unfortunately, up to now most geneticists make the pedigrees manually. There are several programs for doing so (see a list at <http://www.kumc.edu/gec/prof/genecomp.html#pedigree>), but they are rather expensive, lack multilanguage support and the quality of typesetting is somewhat lacking. This package tries to offer a \LaTeX -based solution for this problem. It could be used with a companion Perl program `pedigree` [4], which converts databases of patients into a \LaTeX file.

Note that there are ways to draw genealogical trees with `PSTricks` [3]; see the beautiful ones at <http://www.tug.org/PSTricks/main.cgi?file=Examples/Genealogy/genealogy>. Unfortunately, medical pedigrees are often not *trees*. Therefore we do not use tree approach throughout, but provide it as an alternative. Our general approach is based on the use of nodes [3, Part VII]. Each person or entity is a node, and the lines are in fact `\nclines`. This provides a flexibility to draw complex pedigrees.

Each node in the system *must* have a name. To prevent confusion with names of individuals, we call such name an *id*. As usual in `PSTricks`, it is a sequence of letters and numbers starting with a letter. This rule is very important; a name like 1 or 1-1 can lead to mysterious PostScript errors.

Our symbols follows the standard [1] with the exception that we do not implement showing several conditions on the same chart.

To use the package, add the line

```
\usepackage{pst-pdgr}
```

to a \LaTeX document or

```
\input pst-pdgr.tex
```

to a PLAIN \TeX one. Note that since this is a `PSTricks` package, you need to use `tex-dvips` path to compile your document. If you need a PDF document, you can use `ps2pdf` or packages like `pst-pdf`, `ps4pdf`, `pstricks`.

If you are using the package in a \LaTeX document, you have an added benefit of a local configuration file `pst-pdgr.cfg`. Such file, if exists, will be read. It can be used to override package settings (use `\AtEndOfPackage` for this).

1.2 Global Settings

By default the size of each node is 0.5 `unit`. You can change the size by setting the value of `unit` (1 cm by default) with `\psset`



Figure 1: Setting Style of Affected Individuals



Figure 2: Use of Foreground Colors for Affected Individuals

`\affectedstyle` By default the affected individual is drawn as a black node. This could
`\affectedbgcolor` be changed by setting `\affectedstyle` and `\affectedbgcolor`, see Figure 1.
`\affectedfgcolor` Sometimes we need to write something inside a node representing an affected individual. An example in [1] changes in this situation the style from filled to hatched, which looks inconsistent. We rather change the color of the foreground, as shown on Fig. 2.

1.3 Node Drawing Commands

The node drawing commands are based on the `\pnode` commands from `PSTricks` [3, Part VII]. It is the preferred command for drawing, for example, a “marriage node” (see the examples below). It is useful to remember this when drawing complex pedigrees.

1.3.1 One Person

`\pstPerson` The main command in the package is `\pstPerson`. It draws one person, which is a `PSTricks` node. It has the following structure: `\pstPerson[options]{id}`. The parameter `id` is the name of the node. It can be used to make connections to the node (see below).

There are many options to this command. As other `PSTricks` options, the also can be set globally through `\psset` command.

options The first group of options describes the state of the person: sex, condition with respect to the decease, whether the person is deceased, is a proband, was adopted and was evaluated. These options are listed in Table 1. Some options of this group can take only two values: `true` or `false`. For simplicity the clause `=true` can be omitted, so the clauses `adopted=true` and `adopted` are equivalent. Two

`sex`
`condition`
`deceased`
`proband`
`adopted`
`evaluated`

Option	Values	Default	Description
sex	male, female, unknown	unknown	Sex of the person
condition	normal, obligatory, asymptomatic, affected	normal	The condition of the person
deceased	true, false	false	Whether the person is deceased
proband	true, false	false	Whether the person is a proband
adopted	true, false	false	Whether the individual is adopted
evaluated	true, false	false	Whether a documented evaluation took place

Table 1: Options Showing State of a Person

options: **sex** and **condition** can take several values each (geneticists consider three possibilities for sex: **male**, **female** and **unknown**). Again for simplicity the clauses **sex=** and **condition=** can be omitted, so the invocations **sex=****male** and **male** are equivalent, as well as **condition=****asymptomatic** and **asymptomatic**.

options The second group of options (Table 2) is used to putting text comments inside
insidetext the symbol, above it, below it or to the right or left to it. The text will be typeset
abovetext in a PSTricks LR-box [3]; additional control over the text position can be achieved
belowtext by using `\parbox` or PLAIN \TeX boxes.

lefttext The third group of options (Table 3) is used to set the text position with
righttext respect to the node. They set the reference point of the text. They correspond to
options the usual notation: **r** being right, **l** being left, **t** being top, **b** being bottom and **B**
abovetextrp being baseline. The setting `={}{}` makes the reference point to be the center of the
belowtexttrp box. Note that to prevent the text above and below the symbol to clash with the
lefttexttrp descent lines, the spaces of `2\pslinewidth` are added to the right and to the left
righttexttrp of the symbol.

Examples of usage of this command are shown in Table 4.

1.3.2 Pregnancy Not Carried To Term

\pstAbortion The command `\pstAbortion` is used to draw a pregnancy not carried to term: spontaneous abortions or terminated pregnancies. The format of it the same as for the command `\pstPerson` (see Section 1.3.1): `\pstAbortion[options]{id}`. However, many of options listed in Table 1 are silently ignored. The only options meaningful for these nodes are **sex** and **condition** (only **normal** and **affected** values are possible). All options listed in Table 2 and 3 are valid and have the same meaning as in Section 1.3.1.

option The command has also an option **sab** with the values **true** or **false**. If it
sab is **true**, the pregnancy is a spontaneous abortion. Otherwise it is terminated.

Option	Values	Default	Description
insidetext	String	None	A text to be placed inside the symbol (number of individuals, pregnancy, etc.)
abovetext	String	None	A text to be placed above the symbol (name, number, etc.)
belowtext	String	None	A text to be placed below the symbol (name, number, etc.)
lefttext	String	None	A text to be placed to the left of the symbol (name, number, etc.)
righttext	String	None	A text to be placed to the right of the symbol (name, number, etc.)

Table 2: Options for Making Textual Comments

Option	Values	Default	Description
abovetextrp	Combination of r or l and t , b or B	lB	The reference point for the text above the symbol
belowtextrp	Combination of r or l and t , b or B	lt	The reference point for the text below the symbol
lefttextrp	Combination of r or l and t , b or B	r	The reference point for the text to the left the symbol
righttextrp	Combination of r or l and t , b or B	l	The reference point for the text to the right the symbol

Table 3: Options for Setting Text Reference Point












Command	Result
<code>\pstPerson[condition=asymptomatic]{P}</code>	
<code>\pstPerson[condition=affected, sex=male, evaluated]{P}</code>	 *
<code>\pstPerson[obligatory, female]{P}</code>	
<code>\pstPerson[asymptomatic, male, proband]{P}</code>	
<code>\pstPerson[condition=obligatory, sex=male, deceased]{P}</code>	
<code>\pstPerson[sex=female, adopted, condition=affected, abovetext=Jane]{P}</code>	
<code>\pstPerson[sex=male, condition=affected, belowtext=20 yr, deceased]{P}</code>	 20 yr
<code>\pstPerson[unknown, affected, rightright=\parbox{1cm}{\footnotesize A \1 w}]{P}</code>	 A 1 w
<code>\pstPerson[sex=male, insidetex=5]{P}</code>	
<code>\pstPerson[sex=female, condition=affected, insidetex=P]{P}</code>	
<code>\pstPerson[sex=female, affected, belowtext=\parbox{1cm}{\centering SB\2wks}, deceased]{P}</code>	 SB 2wks

Table 4: Examples of Persons




Command	Symbol
<code>\pstAbortion[belowtext=male]{A}</code>	 male
<code>\pstAbortion[sab, righttext=1w]{A}</code>	 1w
<code>\pstAbortion[affected]{A}</code>	

Table 5: Examples of Abortion Symbols



Command	Symbol
<code>\pstChildless[belowtext=vasectomy]{C}</code>	 vasectomy
<code>\pstChildless[belowtext=anospermia, infertile]{C}</code>	 anospermia

Table 6: Examples of Childlessness or Infertility Symbols

Examples of usage of this command are shown in Table 5.

1.3.3 Childlessness and Infertility

The symbols for childlessness and infertility are listed under “line definitions” in [1]. However, to make the placing the symbols on the chart more flexible, we assign nodes to them.

`\pstChildless` The command for drawing these symbols has the same structure as the other node drawing commands: `\pstChildless`[*options*]{*id*}. While all options listed in Table 4 are valid, the only meaningful one is `belowtext`. Note that the option `belowtextrp` is silently ignored: the text is always centered below the infertility symbol.

option There is one additional option `infertile`, which can have values `true` of `false`. If it is `false`, the person (or relationship) is childless by choice (or by an unknown reason). The clause `=true` can be omitted.

1.4 Connection Drawing Commands

The connections in pedigrees are based on `\ncline` and friends. There are, however, some additional features for pedigree connections.

1.4.1 Relationship

`\pstRelationship` Relationships are marriages or other unions. The main command for drawing

Option	Values	Default	Description
broken	true, false	false	Whether the relationship no longer exists
consanguinic	true, false	false	Whether the relationship is consanguinic
descentnode	Node name	None	A node that will be used to draw descent lines for the relationship
brokenpos	A number between 0 and 1	0.3	Where to put the symbol for broken relationship on the line (as a fraction of the line length)
descentnodepos	A number	0.5	Where to put the the descent node on the relationship line
rellinecmd	Name	ncline	Name of the line drawing command (without \)

Table 7: Options for Relationship Lines

relationships is `\pstRelationship[<options>]{<nodeA>}{<nodeB>}`. It draws a relationship line between `{<nodeA>}` and `{<nodeB>}`. Normal PSTricks options like `linestyle=dashed` can be used with the expected effect.

options There are also several options specific for this command, listed in Table 7. The options **broken** and **consanguinic** are self-explanatory. The option **descentnode** is used, if we want the descent lines to start at a node on the relationship line. The name of this descent node must satisfy the usual criteria for the node (see Section 1.1). The options **brokenpos** and **descentnodepos** determine, where on the relationship line the corresponding objects are placed. The option **rellinecmd** allows to change the default straight line for the relationship to something else, like **ncline**, **ncangle**, etc. Examples of this command use are shown in Table 8

1.4.2 Descent

The paper [1] distinguishes between descent line and sibs line. We, however, will call all segments of the line, joining a parent (or a descent node) and a child the descent line. The main command for showing parent-child relations is `\pstDescent[<options>]{<Parent>}{<Child>}`. It has no special options, but the usual PSTricks options for lines are valid. The most important option is **armB**: the length of the segment between the parent node and the sib line. Note that to make the sib line straight the actual direction of the **ncangle** used by `\pstRelationship` internally is *reversed*: from `{<Child>}` to `{<Parent>}`. Examples of this command are shown in Table 9. Note the option `linestyle=dashed` used to show social parentage in the first example.

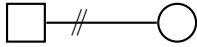
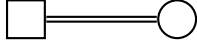
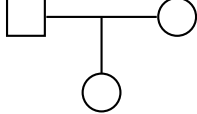
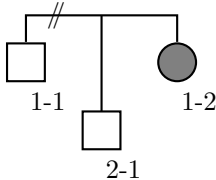
Command	Result
<pre> \put(0.5,0.5){\pstPerson[male]{A}} \put(2.5,0.5){\pstPerson[female]{B}} \pstRelationship[broken]{A}{B} </pre>	
<pre> \put(0.5,0.5){\pstPerson[male]{A}} \put(2.5,0.5){\pstPerson[female]{B}} \pstRelationship[consanguinic]{A}{B} </pre>	
<pre> \put(0.5,1.5){\pstPerson[male]{A}} \put(2.5,1.5){\pstPerson[female]{B}} \put(1.5,0.5){\pstPerson[female]{C}} \pstRelationship[descentnode=AB]{A}{B} \ncline{AB}{C} </pre>	
<pre> \put(0.5,1.5){\pstPerson[male, belowtext=1-1]{A}} \put(2.5,1.5){\pstPerson[affected, female, belowtext=1-2]{B}} \put(1.5,0.6){\pstPerson[male, belowtext=2-1]{C}} \pstRelationship[descentnode=AB, rellinecmd=ncangle, angleA=90, angleB=90, descentnodepos=1.5, broken, brokenpos=1.2]{A}{B} \ncline{AB}{C} </pre>	

Table 8: Examples of Relationships

Command	Result
<pre> \put(1.5,2){\pstPerson[female]{A}} \put(0.5,0.5){\pstPerson[female, adopted]{B}} \put(1.5,0.5){\pstPerson[male]{C}} \put(2.5,0.5){\pstAbortion[female]{D}} \pstDescent[linestyle=dashed]{A}{B} \pstDescent{A}{C} \pstDescent{A}{D} </pre>	
<pre> \psset{armB=1} \put(0.5,2){\pstPerson[male, belowtext=Fred]{A}} \put(2.5,2){\pstPerson[female, obligatory, belowtext=Ginger]{B}} \pstRelationship[descentnode=AB]{A}{B} \put(0.5,0.5){\pstPerson[male,asymptomatic, belowtext=John]{C1}} \put(1.5,0.5){\pstPerson[female, belowtext=Mary]{C2}} \put(2.5,0.5){\pstAbortion[sab, affected, belowtext=male]{C3}} \pstDescent{AB}{C1} \pstDescent{AB}{C2} \pstDescent{AB}{C3} </pre>	
<pre> \put(0.5,1.5){\pstPerson[male]{A}} \put(2.5,1.5){\pstPerson[female]{B}} \pstRelationship[descentnode=AB]{A}{B} \put(1.5,0.5){\pstChildless[infertile, belowtext=anospermia]{C}} \pstDescent{AB}{C} </pre>	

Table 9: Examples of Descent Lines

Option	Values	Default	Description
<code>monozygotic</code>	<code>true, false</code>	<code>false</code>	Whether the twins are monozygotic
<code>qzygotic</code>	<code>true, false</code>	<code>false</code>	Whether the monozygoticity of twins is questionable
<code>addtwin</code>	Twin node	Node	Additional twin node id if there are more than two twins (this option may be repeated)
<code>mzlinepos</code>	A number	0.5	Where to put the horizontal line for monozygotic twins (as a factor of the total line length)

Table 10: Options for Twins Lines

1.4.3 Twins

`\pstTwins` A special care is needed when we talk about twins. First, the user must define a *twin node*: the node which is used as a nexus for twin lines. Then the following command draws all the necessary lines:

`\pstTwins[options]{Parent}{TwinNode}{LeftTwin}{RightTwin}`.

options The options for this command are listed in Table 10. The option `monozygotic` allows to show that the twins are monozygotic. The actual position of the horizontal line is determined by the option `mzlinepos`. If it is unknown, whether the twins are monozygotic or not, `qzygotic` options draws a question mark, as recommended by [1]. Note that `mzlinepos` in this situation helps to position the question mark properly. The option `addtwin` allows to draw pedigrees with more than two twins. It can be repeated several times if necessary. Examples of the usage of this command are shown in Table 11.

1.5 Making Trees

As discussed above (Section 1.1), the medical pedigrees are not necessary trees. Even if they are, they are usually not simple layered trees. Nevertheless sometimes pedigree can be represented as a layered tree. For such cases we provide tree drawing commands. See the discussion in [4] for more details.

`\TpstPerson` The macros `\TpstPerson`, `\TpstAbortion` and `\TpstChildless` have the same options and arguments as their “normal” counterparts. You probably need to use command like

```
\def\psedge{\pstDescent}
\psset{armB=1}
```

Command	Result
<pre> \put(1.5,2){\pstPerson[female]{A}} \put(1,1.1){\pnode{Twins}} \put(0.5,0.5){\pstPerson[male]{B}} \put(1.5,0.5){\pstPerson[male]{C}} \put(2.5,0.5){\pstPerson[female]{D}} \pstTwins[monozygotic]{A}{Twins}{B}{C} \pstDescent{A}{D} </pre>	
<pre> \put(0.5,2){\pstPerson[male]{A}} \put(2.5,2){\pstPerson[female]{B}} \pstRelationship[descentnode=AB]{A}{B} \put(1.5,1.2){\pnode{Twins}} \put(1,0.5){\pstPerson[male]{C1}} \put(2,0.5){\pstPerson[male]{C2}} \pstTwins[qzygotic, mzlinepos=0.8]{AB}{Twins}{C1}{C2} </pre>	
<pre> \put(1.5,2){\pstPerson[male]{A}} \put(1.5,1.5){\pnode{Twins}} \put(0.5,0.5){\pstPerson[female]{B}} \put(1.2,0.5){\pstPerson[female]{C}} \put(1.9,0.5){\pstPerson[female]{D}} \put(2.6,0.5){\pstPerson[female]{E}} \pstTwins[addtwin=C, addtwin=D]{A}{Twins}{B}{E} </pre>	

Table 11: Examples of Twins Lines

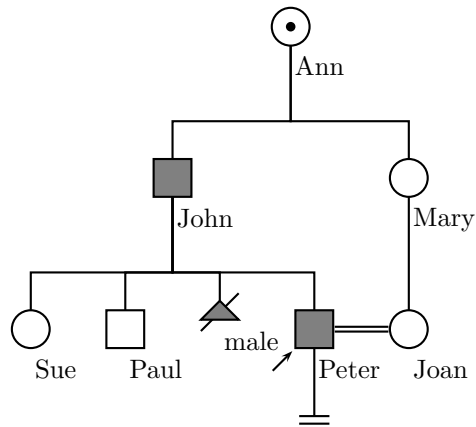


Figure 3: Example of Using Tree-Making Commands

in your code. An example of use of such commands is shown on Figure 3. Note that the resulting figure is *not* a tree! The corresponding code is shown on Figure 4.

1.6 More Examples

A number of examples were listed above. Here we show even more examples of complex pedigrees.

On Figure 5 we show an example of a pedigree from [2]. The corresponding code is listed on Figure 6.

A very complex pedigree is used as an example in [1]. On Figure 7 we reproduce this pedigree. The corresponding code is shown on Figures 8, 9 and 10.

```

\begin{pspicture}(0,1)(7,7)
\rput(3,4){%
\pstree{\TpstPerson[female, obligatory, belowtext=Ann]{Ann}}{%
\def\psedge{\pstDescent}\psset{armB=1}
\pstree{\TpstPerson[male, affected, belowtext=John]{John}}{%
\TpstPerson[female, belowtext=Sue]{Sue}
\TpstPerson[male, belowtext=Paul]{Paul}
\TpstAbortion[affected, belowtext=males]{A1}
\pstree[thislevelsep=1.2]{\TpstPerson[male,
belowtext=Peter, affected, proband]{Peter}}{%
\def\psedge{\ncline}
\TpstChildless[infertile]{C1}
}
}
\pstree{\TpstPerson[female, belowtext=Mary]{Mary}}{
\TpstPerson[female, belowtext=Joan]{Joan}
}
}
}
\pstRelationship[consanguinic]{Peter}{Joan}
\end{pspicture}

```

Figure 4: Code Producing Figure 3

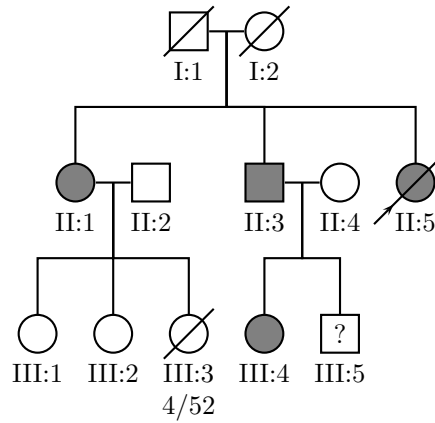


Figure 5: Example of a Pedigree of a Family With PROMM From [2, p. 48]


```

\begin{pspicture}(6,6)
  \psset{belowtext=trp=t, armB=1}
  \rput(2.5,5.5){\pstPerson[male, deceased, belowtext=I:1]{I:1}}
  \rput(3.5,5.5){\pstPerson[female, deceased, belowtext=I:2]{I:2}}
  \pstRelationship[descentnode=I:1_2]{I:1}{I:2}
  \rput(1,3.5){\pstPerson[female, affected, belowtext=II:1]{II:1}}
  \pstDescent{I:1_2}{II:1}
  \rput(2,3.5){\pstPerson[male, belowtext=II:2]{II:2}}
  \pstRelationship[descentnode=II:1_2]{II:1}{II:2}
  \rput(3.5,3.5){\pstPerson[male, affected, belowtext=II:3]{II:3}}
  \pstDescent{I:1_2}{II:3}
  \rput(4.5,3.5){\pstPerson[female, belowtext=II:4]{II:4}}
  \pstRelationship[descentnode=II:3_4]{II:3}{II:4}
  \rput(5.5,3.5){\pstPerson[female, affected, deceased, proband,
    belowtext=II:5]{II:5}}
  \pstDescent{I:1_2}{II:5}
  \rput(0.5,1.5){\pstPerson[female, belowtext=III:1]{III:1}}
  \pstDescent{II:1_2}{III:1}
  \rput(1.5,1.5){\pstPerson[female, belowtext=III:2]{III:2}}
  \pstDescent{II:1_2}{III:2}
  \rput(2.5,1.5){\pstPerson[female, deceased,
    belowtext=\parbox{2cm}{\centering III:3\4/52}]{III:3}}
  \pstDescent{II:1_2}{III:3}
  \rput(3.5,1.5){\pstPerson[female, affected,
    belowtext=III:4]{III:4}}
  \pstDescent{II:3_4}{III:4}
  \rput(4.5,1.5){\pstPerson[male, insidetext=?,
    belowtext=III:5]{III:5}}
  \pstDescent{II:3_4}{III:5}
\end{pspicture}

```

Figure 6: Code Producing Figure 5



Figure 7: A Complex Pedigree From [1]

```

\psset{armB=1.1, hatchsep=1.5pt}
\rput(3.5,8){Ethnic Background}
\rput(18.5,8){Ethnic Background}
\rput(3.5,7.5){\rnode{0Type1}{0'Type}}
\rput(18.5,7.5){\rnode{0Origin2}}
\rput(6.5,7.5){\rnode{Quest1}{?}}
\rput(1,6.5){\Huge I}
\rput(1.5,6.5){\pstPerson[male, belowtext=1]{I1}}
\rput(2.5,6.5){\pstPerson[female, obligatory, belowtext=2]{I2}}
\rput(3.5,6.5){\pstPerson[male, belowtext=3]{I3}}
\rput(4.5,6.5){\pstPerson[male, belowtext=4]{I4}}
\rput(5.5,6.5){\pstPerson[male, belowtext=5]{I5}}
\rput(6.5,6.5){\pstPerson[female, affected,
    belowtext=6]{I6}}
\rput(2,7.2){\pnode{Twins1}}
\rput(4,7.2){\pnode{Twins2}}
\pstTwins[armB=0]{0Type1}{Twins1}{I1}{I2}
\pstTwins[qzygotic, armB=0, mzlinepos=0.8]{0Type1}{Twins2}{I3}{I4}
\pstDescent[armB=0]{0Type1}{I5}
\pstDescent[armB=0]{Quest1}{I6}
\pstRelationship[descentnode=I5I6]{I5}{I6}
\rput(1.5,5.5){\pstChildless{CI1}}
\ncline{I1}{CI1}
\rput(13.5,6.5){\pstPerson[male, deceased, belowtext=trp=t,
    belowtext=\parbox{2cm}{\centering d. 72 y\7}]{I7}}
\rput(15.5,6.5){\pstPerson[female, deceased, belowtext=trp=t,
    belowtext=\parbox{2cm}{\centering d. 70 y\8}]{I8}}
\pstRelationship[descentnode=I7I8]{I7}{I8}
\rput(21,6.5){\pstPerson[insidetext=5, belowtext=9--14,
    belowtext=trp=rt]{I9}}
\pstDescent[armB=0]{0Origin2}{I8}
\pstDescent[armB=0]{0Origin2}{I9}

```

Figure 8: Code for Figure 7: Generation I

```

\put(1,4.5){\Huge II}
\put(2.5,4.5){\pstPerson[male, affected, belowtext=1,
  abovetext=Proto, abovetextrp=rB]{II1}}
\pstDescent{I2}{II1}
\put(4.5,4.5){\pstPerson[female, asymptomatic,
  belowtext=\parbox{3cm}{32 y\
  $E_3-\$\\$E_4+(\frac{45n}{18n})^2}, abovetext={Sterrie},
  abovetextrp=rB, evaluated]{II2}}
\pstDescent{I5I6}{II2}
\pstRelationship[consanguinic, descentnode=II1II2]{II1}{II2}
\put(5.5,5.2){\rnode{Quest2}{?}}
\put(5.5,4.5){\pstPerson[female, insidetext=D,
  belowtext=3]{II3}}
\ncline{Quest2}{II3}
\put(6.5,5.2){\rnode{Quest3}{?}}
\put(6.5,4.5){\pstPerson[male, insidetext=D,
  belowtext=4]{II4}}
\ncline{Quest3}{II4}
\put(7.5,4.5){\pstPerson[female, belowtext=5]{II5}}
\put(8.5,4.5){\pstPerson[male, abovetext=Gary, abovetextrp=rB,
  belowtext=\parbox{2cm}{36 y\\$E_3-\$\\6},
  evaluated]{II6}}
\put(9.5,4.5){\pstPerson[male, abovetext={Gene},
  belowtext=\parbox{2cm}{36 y\\$E_3-\$\\7},
  evaluated]{II7}}
\put(9,5.2){\pnode{Twins3}}
\pstTwins[monozygotic]{I5I6}{Twins3}{II6}{II7}
\pstRelationship{II5}{II6}
\put(7.5,5.7){0'Type}
\put(11.5,4.5){\pstPerson[female, proband,
  belowtext=\parbox{1cm}{35 y\\8}, abovetext=Feene]{II8}}
\pstRelationship[descentnode=II7II8]{II7}{II8}
\put(13.5,4.5){\pstPerson[male, belowtext=9]{II9}}
\pstRelationship[broken, descentnode=II8II9,
  descentnodepos=0.85]{II8}{II9}
\put(16,4.5){\pstPerson[abovetext=Stacey, female,
  abovetextrp=rB,
  belowtext=\parbox{1cm}{33y\\ 10}]{II10}}
\def\affectedstyle{fillstyle=crosshatch}
\put(17,4.5){\pstPerson[male, affected, abovetext=Sam,
  belowtext=\parbox{3cm}{31 y\\ $E_2+\$\\
  11}, hatchsep=3pt]{II11}}
\put(17,3.5){\pstChildless[infertile]{C2}}
\ncline{II11}{C2}
\put(18,4.5){\pstPerson[male, obligatory,
  abovetext=Donald,
  belowtext=\parbox{3cm}{29 y\\ $E_2+\$ \\
  12}]{II12}}
\pstDescent{I7I8}{II8}
\pstDescent{I7I8}{II10}
\pstDescent{I7I8}{II11}
\pstDescent{I7I8}{II12}
\put(19,4.5){\pstPerson[female, belowtext=13]{II13}}
\pstRelationship[descentnode=II12II13]{II12}{II13}
\put(20,4.5){\pstPerson[female, insidetext=S,
  belowtext=14]{II14}}
\put(21,4.5){\pstPerson[insidetext=n]{II15}}
\pstDescent{I9}{II15}

```

Figure 9: Code for Figure 7: Generation II

```

\put(1,2.5){\Huge III}
\put(3,2.5){\pstPerson[male, adopted, belowtext=1]{III1}}
\put(4,2.5){\pstPerson[insidetext=P, belowtext=2]{III2}}
\pstDescent[linestyle=dashed]{II1II2}{III1}
\pstDescent{II1II2}{III2}
\ncline{II3}{III2}
\put(7.5,2.5){\pstPerson[insidetext=P,
    belowtext=\parbox{2cm}{6 wk\3}]{III3}}
\pstDescent{II5}{III3}
\ncline{II4}{III3}
\def\affectedstyle{fillstyle=vlines}
\put(10,2.5){\pstAbortion[affected,
    belowtext=\parbox{2cm}{\centering
        female\18wk\ $E_1+(\tri 21)\4},
    belowtext=trp]{III4}}
\put(11,2.5){\pstPerson[insidetext=P,
    belowtext=\parbox{1cm}{16wk\5}]{III5}}
\pstDescent{II7II8}{III4}
\pstDescent{II7II8}{III5}
\put(12,2.5){\pstAbortion[belowtext=6]{III6}}
\put(13,2.5){\pstAbortion[sab, belowtext=trp,
    belowtext=\parbox{2cm}{\centering female\19 wk\
    7}]{III7}}
\put(14,2.5){\pstPerson[adopted, male,
    belowtext=\parbox{1cm}{10 y\ 8}]{III8}}
\pstDescent{II8II9}{III6}
\pstDescent{II8II9}{III7}
\pstDescent{II8II9}{III8}
\ncline[linestyle=dashed]{II10}{III8}
\put(15,2.5){\pstAbortion[sab, belowtext=9]{III9}}
\def\affectedstyle{fillstyle=hlines}
\put(16,2.5){\pstAbortion[sab, belowtext=trp, affected,
    belowtext=\parbox{2cm}{\centering male\ 20 wk\ $E_1+$
    (\tri 18)\ 10}]{III10}}
\put(17,2.5){\pstPerson[deceased, female,
    belowtext=\parbox{1cm}{\centering SB\32 wk\
    11}]{III11}}
\pstDescent{II10}{III9}
\pstDescent{II10}{III10}
\pstDescent{II10}{III11}
\put(20,2.5){\pstPerson[insidetext=P,
    belowtext=12]{III12}}
\pstDescent{II14}{III12}
\ncline{II12II13}{III12}

```

Figure 10: Code for Figure 7: Generation III

2 Implementation

2.1 Identification and Setting Up

Traditionally PSTricks works in two regimes: the \LaTeX one and the plain one. Probably it is a good idea to keep this tradition. Therefore we will use a \TeX file `pst-pdgr.tex` and a \LaTeX file `pst-pdgr.sty`. They have different means of preserving from loading twice and identification.

`\PSTPedigreeLoaded` A \TeX guard `\PSTPedigreeLoaded` prevents the double loading of the file:

```
1 <*tex>
2 \csname PSTPedigreeLoaded\endcsname
3 \let\PSTPedigreeLoaded\endinput
4 </tex>
```

Now we can start real identification. Note the difference between the ways a \LaTeX style, a \LaTeX configuration file and a \TeX file announce itself

```
5 <latex>\NeedsTeXFormat{LaTeX2e}
6 <latex>\ProvidesPackage{pst-pdgr}
7 <cfg>\ProvidesFile{pst-pdgr.cfg}
8 <tex>\message{
9 [2006/04/18 v0.2a Medical Pedigree with PSTricks]
10 <tex>}
```

The \LaTeX style is in fact just a wrapper: it calls the configuration file, and then the \TeX file, which does the real work:

```
11 <*latex>
12 \InputIfFileExists{pst-pdgr.cfg}{%
13 \typeout{Loading configuration file pst-pdgr.cfg}}{%
14 \typeout{Configuration file pst-pdgr.cfg is not found}}
15 \input{pst-pdgr.tex}
16 </latex>
```

Now we are dealing (almost) exclusively with \TeX .

```
17 <*tex>
```

Check the packages we use are loaded:

```
18 \ifx\PSTricksLoaded\endinput\else\input pstricks.tex\fi
19 \ifx\PSTnodesLoaded\endinput\else\input pst-node.tex\fi
20 \ifx\PSTreeLoaded\endinput\else\input pst-tree.tex\fi
21 \ifx\PSTXKeyLoaded\endinput\else\input pst-xkey.tex\fi
```

We set up that @ symbol:

```
22 \catcode'\@=11\relax
```

and set up keys for our package

```
23 \pst@addfams{pst-pdgr}
```

2.2 Global Parameters

These macros define the way affected individuals are drawn

`\affectedbgcolor` The background color:
24 `\def\affectedbgcolor{gray}`

`\affectedfgcolor` The foreground color for the text:
25 `\def\affectedfgcolor{white}`

`\affectedstyle` And the style:
26 `\def\affectedstyle{fillstyle=solid, fillcolor=\affectedbgcolor}`

`\pst@pdgr@intxtcolor` Normally the color of the inside text for normal persons is the current color:
27 `\def\pst@pdgr@intxtcolor{\relax}`

2.3 Options

Here we define the option for the commands and their action.

2.3.1 Choice Options

This groups of options sets a key from a given set of choices.

`\pst@pdgr@sex` First, the sex of the person. The numbers 0, 1 and 2 correspond to the sequence in the alternatives list
28 `\def\pst@pdgr@sex{0}`
29 `\define@choicekey[psset]{pst-pdgr}{sex}[\pst@pdgr@temp \pst@pdgr@sex]{%`
30 `unknown,male,female}[unknown]}`

`\pst@pdgr@condition` Next, the condition of the person. The numbers again correspond to the sequence in the alternatives list
31 `\def\pst@pdgr@condition{0}`
32 `\define@choicekey[psset]{pst-pdgr}{%`
33 `condition}[\pst@pdgr@temp \pst@pdgr@condition]{%`
34 `normal,obligatory,asymptomatic,affected}[normal]}`

A bunch of shortcuts
35 `\define@key[psset]{pst-pdgr}{unknown}[]{\psset{sex=unknown}}`
36 `\define@key[psset]{pst-pdgr}{male}[]{\psset{sex=male}}`
37 `\define@key[psset]{pst-pdgr}{female}[]{\psset{sex=female}}`
38 `\define@key[psset]{pst-pdgr}{normal}[]{\psset{condition=normal}}`
39 `\define@key[psset]{pst-pdgr}{obligatory}[]{\psset{condition=obligatory}}`
40 `\define@key[psset]{pst-pdgr}{asymptomatic}[]{\psset{condition=asymptomatic}}`
41 `\define@key[psset]{pst-pdgr}{affected}[]{\psset{condition=affected}}`

2.3.2 Boolean Options

True or false options.

<code>\pst@pdgr@defineboolkey</code>	We use our own version of definition of boolean keys, rather than the one provided by <code>xkeyval</code> . <pre> 42 \def\pst@pdgr@defineboolkey#1{% 43 \expandafter\newif\csname ifpst@pdgr@#1\endcsname% 44 \csname pst@pdgr@#1false\endcsname% 45 \define@key[psset]{pst-pdgr}{#1}[true]{% 46 \@nameuse{pst@pdgr@#1#1}}}</pre>
<code>\ifpst@pdgr@deceased</code>	Whether the individual is deceased: <pre> 47 \pst@pdgr@defineboolkey{deceased}</pre>
<code>\ifpst@pdgr@proband</code>	Whether the individual is a proband: <pre> 48 \pst@pdgr@defineboolkey{proband}</pre>
<code>\ifpst@pdgr@adopted</code>	Whether the individual is adopted: <pre> 49 \pst@pdgr@defineboolkey{adopted}</pre>
<code>\ifpst@pdgr@evaluated</code>	Whether the individual is evaluated: <pre> 50 \pst@pdgr@defineboolkey{evaluated}</pre>
<code>\ifpst@pdgr@sab</code>	Whether the abortion is SAB: <pre> 51 \pst@pdgr@defineboolkey{sab}</pre>
<code>\ifpst@pdgr@infertile</code>	Whether the individual or relationship is infertile: <pre> 52 \pst@pdgr@defineboolkey{infertile}</pre>
<code>\ifpst@pdgr@broken</code>	Whether the relationship is broken: <pre> 53 \pst@pdgr@defineboolkey{broken}</pre>
<code>\ifpst@pdgr@consanguinic</code>	Whether the relationship is consanguinic: <pre> 54 \pst@pdgr@defineboolkey{consanguinic}</pre>
<code>\ifpst@pdgr@monozygotic</code>	Whether the twins are monozygotic: <pre> 55 \pst@pdgr@defineboolkey{monozygotic}</pre>
<code>\ifpst@pdgr@qzygotic</code>	Whether they are questionably monozygotic: <pre> 56 \pst@pdgr@defineboolkey{qzygotic}</pre>

2.3.3 String Options

Options setting up strings.

<code>\pst@pdgr@insidetext</code>	Text inside the symbol <pre> 57 \def\pst@pdgr@insidetext{}% 58 \define@key[psset]{pst-pdgr}{insidetext}{% 59 \def\pst@pdgr@insidetext{#1}}%</pre>
<code>\pst@pdgr@belowtext</code>	Text below the symbol <pre> 60 \def\pst@pdgr@belowtext{}% 61 \define@key[psset]{pst-pdgr}{belowtext}{% 62 \def\pst@pdgr@belowtext{#1}}%</pre>
<code>\pst@pdgr@abovetext</code>	Text above the symbol <pre> 63 \def\pst@pdgr@abovetext{}% 64 \define@key[psset]{pst-pdgr}{abovetext}{% 65 \def\pst@pdgr@abovetext{#1}}%</pre>
<code>\pst@pdgr@lefttext</code>	Text to the left of the symbol <pre> 66 \def\pst@pdgr@lefttext{}% 67 \define@key[psset]{pst-pdgr}{lefttext}{% 68 \def\pst@pdgr@lefttext{#1}}%</pre>
<code>\pst@pdgr@righttext</code>	Text to the right of the symbol <pre> 69 \def\pst@pdgr@righttext{}% 70 \define@key[psset]{pst-pdgr}{righttext}{% 71 \def\pst@pdgr@righttext{#1}}%</pre>
<code>\pst@pdgr@descentnode</code>	Name of the descent node <pre> 72 \def\pst@pdgr@descentnode{}% 73 \define@key[psset]{pst-pdgr}{descentnode}{% 74 \def\pst@pdgr@descentnode{#1}}%</pre>
<code>\pst@pdgr@rellinecmd</code>	Command to draw relationship lines: <pre> 75 \def\pst@pdgr@rellinecmd{\ncline}% 76 \define@key[psset]{pst-pdgr}{rellinecmd}{% 77 \def\pst@pdgr@rellinecmd{\@nameuse{#1}}}%</pre> <p>A number of text positioning commands.</p>
<code>\pst@pdgr@abovetextrp</code>	The command to set the reference position for the text above the symbol. <pre> 78 \def\pst@pdgr@abovetextrp{1B}% 79 \define@key[psset]{pst-pdgr}{abovetextrp}{% 80 \def\pst@pdgr@abovetextrp{#1}}%</pre>
<code>\pst@pdgr@belowtextrp</code>	The command to set the reference position for the text below the symbol. <pre> 81 \def\pst@pdgr@belowtextrp{1t}% 82 \define@key[psset]{pst-pdgr}{belowtextrp}{% 83 \def\pst@pdgr@belowtextrp{#1}}%</pre>

`\pst@pdgr@lefttextrp` The command to set the reference position for the text to the left of the symbol.

```
84 \def\pst@pdgr@lefttextrp{r}%
85 \define@key[psset]{pst-pdgr}{lefttextrp}{%
86   \def\pst@pdgr@lefttextrp{#1}}%
```

`\pst@pdgr@righttextrp` The command to set the reference position for the text to the right of the symbol.

```
87 \def\pst@pdgr@righttextrp{l}%
88 \define@key[psset]{pst-pdgr}{righttextrp}{%
89   \def\pst@pdgr@righttextrp{#1}}%
```

The option `addtwin` for `\pstTwin` command is special. Since it can be repeated, we want it to be executed immediately. We store the name of the descentnode in `\pst@pdgr@tempnode`

```
90 \define@key[psset]{pst-pdgr}{addtwin}{\ncline{\pst@pdgr@tempnode}{#1}}%
91 \define@key[psset]{pst-pdgr}{descentnode}{%
92   \def\pst@pdgr@descentnode{#1}}%
```

2.3.4 Numerical Options

The options to set up numerical values.

`\pst@pdgr@descentnodepos` The position of the descent node on the relationship line

```
93 \def\pst@pdgr@descentnodepos{0.5}
94 \define@key[psset]{pst-pdgr}{descentnodepos}{%
95   \pst@checknum{#1}\pst@pdgr@descentnodepos%
96   \ifdim\pst@pdgr@descentnodepos <\z@
97     \def\pst@pdgr@descentnodepos{0.5}%
98     \@pstrickserr{Bad 'descentnodepos' value: '#1'. Must be >0}\@ehpa%
99   \fi}%

```

`\pst@pdgr@brokenpos` The position of the broken line symbol on the relationship line

```
100 \def\pst@pdgr@brokenpos{0.3}
101 \define@key[psset]{pst-pdgr}{brokenpos}{%
102   \pst@checknum{#1}\pst@pdgr@brokenpos%
103   \ifdim\pst@pdgr@brokenpos <\z@
104     \def\pst@pdgr@brokenpos{0.3}%
105     \@pstrickserr{Bad 'brokenpos' value: '#1'. Must be >0}\@ehpa%
106   \fi}%

```

`\pst@pdgr@mzlinepos` The position of the monozygotic line or question mark on the twins line:

```
107 \def\pst@pdgr@mzlinepos{0.5}
108 \define@key[psset]{pst-pdgr}{mzlinepos}{%
109   \pst@checknum{#1}\pst@pdgr@mzlinepos%
110   \ifdim\pst@pdgr@mzlinepos <\z@%
111     \def\pst@pdgr@mzlinepos{0.5}%
112     \@pstrickserr{Bad 'mzlinepos' value: '#1'. Must be >0}\@ehpa%
113   \fi%
114   \ifdim\pst@pdgr@mzlinepos >\p@>\p@\relax%
```

```

115 \def\pst@pdgr@mzlinepos{0.5}%
116 \@pstrickserr{Bad 'mzlinepos' value: '#1'. Must be <1}\@ehpa%
117 \fi}%

```

2.4 Drawing A Person

And now the main macro.

```

\pstPerson First, the standard processing of optional parameter
118 \def\pstPerson{\@ifnextchar[{\pstPerson@i}{\pstPerson@i []}}

\pstPerson@i And now we are ready for a real work. Actually we create a rnode and put
              everything inside. We add a \pspicture for the node to have non-zero size.
119 \def\pstPerson@i[#1]#2{%
120 \rnode{#2}{%
121 \psset{arrows=-, linestyle=solid}%
122 \psset{#1}%
123 \pspicture[shift=-0.25](-0.25,-0.25)(0.25,0.25)%
      Condition processing.
124 \ifcase\pst@pdgr@condition\relax % Nothing to do if normal
125 \or % obligatory
126 \psdot(0,0)%
127 \or % asymptomatic
128 \qline(0,0.25)(0,-0.25)%
129 \or % affected
130 \expandafter\psset\expandafter{\affectedstyle}%
131 \def\pst@pdgr@instxtcolor{\csname\affecteddfgcolor\endcsname}%
132 \fi%
      The actual drawing
133 \ifcase\pst@pdgr@sex\relax % First, unknown sex. A diamond
134 \pspolygon(0,0.25)(0.25,0)(0,-0.25)(-0.25,0)%
135 \or % Male. A square with side 0.5
136 \pspolygon(-0.25,-0.25)(-0.25,0.25)(0.25,0.25)(0.25,-0.25)%
137 \or % Female. A circle with radius 0.25
138 \pscircle{0.25}%
139 \fi%
      Necessary for next
140 \psset{fillstyle=none}%
      Deceased or not?
141 \ifpst@pdgr@deceased%
142 \qline(-0.33,-0.33)(0.33,0.33)%
143 \fi%
      Proband or not?
144 \ifpst@pdgr@proband%
145 \psline[arrows=->](-0.55,-0.55)(-0.29,-0.29)%
146 \fi%

```

Adopted or not?

```

147 \ifpst@pdgr@adopted%
148 \psline(-0.25,-0.35)(-0.35,-0.35)(-0.35,0.35)(-0.25,0.35)%
149 \psline(0.25,-0.35)(0.35,-0.35)(0.35,0.35)(0.25,0.35)%
150 \fi%

```

Evaluated or not?

```

151 \ifpst@pdgr@evaluated%
152 \rput(0.4,-0.4){$\ast$}%
153 \fi%

```

Now a bunch of text putting commands

```

154 \ifx\pst@pdgr@abovetext\empty\relax\else%
155 \rput[\pst@pdgr@abovetextrp](0,0.4){%
156 \kern2\pslinewidth\pst@pdgr@abovetext\kern2\pslinewidth}%
157 \fi%
158 \ifx\pst@pdgr@belowtext\empty\relax\else%
159 \rput[\pst@pdgr@belowtextrp](0,-0.4){%
160 \kern2\pslinewidth\pst@pdgr@belowtext\kern2\pslinewidth}%
161 \fi%
162 \ifx\pst@pdgr@righttext\empty\relax\else%
163 \rput[\pst@pdgr@righttextrp](0.4,0){\pst@pdgr@righttext}%
164 \fi%
165 \ifx\pst@pdgr@lefttext\empty\relax\else%
166 \rput[\pst@pdgr@lefttextrp](-0.4,0){\pst@pdgr@lefttext}%
167 \fi%

```

Inside text is a bit more difficult since we want to be able to do reverse video if necessary

```

168 \ifx\pst@pdgr@insidetext\empty\relax\else%
169 \rput(0,0){\pst@pdgr@instxtcolor\pst@pdgr@insidetext}%
170 \fi%
171 \endpspicture%
172 }}%

```

2.5 Drawing A Terminated Pregnancy

`\pstAbortion` First, the standard processing of optional parameter

```

173 \def\pstAbortion{\@ifnextchar[{\pstAbortion@i}{\pstAbortion@i[]}}%

```

`\pstAbortion@i` And the actual macro:

```

174 \def\pstAbortion@i[#1]#2{%
175 \rnode{#2}{%
176 \psset{arrows=-, linestyle=solid}%
177 \psset{#1}%

```

The standard [1] requires the lines for the terminated pregnancies to be shorter than for the normal ones. A way to do this is to make the node *higher*:

```

178 \pspicture[shift=-0.25](-0.25,-0.25)(0.25,0.5)%

```

Condition processing:

```

179 \ifcase\pst@pdgr@condition\relax % Nothing to do if normal
180 \or \relax % Nothing to do if obligatory
181 \or \relax % Nothing to do if asymptomatic
182 \or % affected
183 \expandafter\psset\expandafter{\affectedstyle}%
184 \fi%

```

If this is a terminated pregnancy, we use the same symbol as for deceased:

```

185 \ifpst@pdgr@sab\relax\else%
186 \qline(-0.25,0.1)(0.25,0.6)%
187 \fi%

```

The actual drawing

```

188 \pspolygon(-0.25,0.25)(0,0.5)(0.25,0.25)

```

And text putting commands

```

189 \ifx\pst@pdgr@abovetext\@empty\relax\else%
190 \rput[\pst@pdgr@abovetextrp](0,0.65){%
191 \kern2\pslinewidth\pst@pdgr@abovetext\kern2\pslinewidth}%
192 \fi%
193 \ifx\pst@pdgr@belowtext\@empty\relax\else%
194 \rput[\pst@pdgr@belowtexttrp](0,0.1){%
195 \kern2\pslinewidth\pst@pdgr@belowtext\kern2\pslinewidth}%
196 \fi%
197 \ifx\pst@pdgr@righttext\@empty\relax\else%
198 \rput[\pst@pdgr@righttexttrp](0.4,0.35){\pst@pdgr@righttext}%
199 \fi%
200 \ifx\pst@pdgr@lefttext\@empty\relax\else%
201 \rput[\pst@pdgr@lefttexttrp](-0.4,0.35){\pst@pdgr@lefttext}%
202 \fi%
203 \endpspicture%
204 }}%

```

2.6 Drawing A Childlessness Symbol

\pstChildless Again, the standard processing of optional parameter

```

205 \def\pstChildless{\@ifnextchar[{\pstChildless@i}{\pstChildless@i []}}%

```

\pstChildless@i And the actual macro:

```

206 \def\pstChildless@i[#1]#2{%
207 \rnode{#2}{%
208 \psset{arrows=-, linestyle=solid}%
209 \psset{#1}%

```

The actual drawing depends on the infertile option. If it is true, we want a double line (an non-zero height). Otherwise this is a single line with zero height:

```

210 \ifpst@pdgr@infertile % double line
211 \pspicture[shift=-0.05](-0.2,-0.05)(0.2,0.05)%
212 \qline(-0.2,-0.05)(0.2,-0.05)%

```

```

213      \qline(-0.2,0.05)(0.2,0.05)%
214      \endpspicture%
215      \else % single line
216      \qline(-0.2,0)(0.2,0)%
217      \fi%
    And the text below the symbol:
218      \ifx\pst@pdgr@belowtext\@empty\relax\else%
219      \rput[t](0,-0.2){\pst@pdgr@belowtext}%
220      \fi%
221 }}%

```

2.7 Drawing A Relationship Line

`\pstRelationship` The `\pstRelationship` command can have both optional and non-optional parameters:

```

222 \def\pstRelationship{\@ifnextchar[%
223   \pstRelationship@i]{\pstRelationship@i[]}}%

```

`\pstRelationship@i` The actual macro:

```

224 \def\pstRelationship@i[#1]#2#3{%
225   \begingroup%
226   \psset{arrows=-, linestyle=solid, nodesep=0.7\pslinewidth}%
227   \psset{#1}%

```

A consanguinic relationship is shown by a double line:

```

228   \ifpst@pdgr@consanguinic%
229     \psset{doubleline=true}%
230   \else%
231     \psset{doubleline=false}%
232   \fi%

```

The actual drawing

```

233   \pst@pdgr@rellinecmd{#2}{#3}%

```

The broken relationships are shown using `//`:

```

234   \ifpst@pdgr@broken%
235     \lput(\pst@pdgr@brokenpos){/\kern-0.7ex/}%
236   \fi%

```

And the descent node

```

237   \ifx\pst@pdgr@descentnode\@empty\relax%
238   \else%
239     \lput(\pst@pdgr@descentnodepos){\pnode{\pst@pdgr@descentnode}}%
240   \fi%
241   \endgroup%
242 }%

```

2.8 Drawing a Descent Line

`\pstDescent` The standard option processing command:

```
243 \def\pstDescent{\@ifnextchar[{\pstDescent@i}{\pstDescent@i[]}}%
```

`\pstDescent@i` The actual macro. Note the “reverse” direction of the line: this is because for `\ncangle` only `armB` is constant, and we want the sib line to be straight

```
244 \def\pstDescent@i[#1]#2#3{%
245   \begingroup%
246   \psset{arrows=-, linestyle=solid, angleA=90, %
247         angleB=-90}%
248   \psset{#1}%
249   \ncangle{#3}{#2}%
250   \endgroup}%

```

2.9 Drawing Twins

`\pstTwins` The standard option processing command:

```
251 \def\pstTwins{\@ifnextchar[{\pstTwins@i}{\pstTwins@i[]}}%
```

`\pstTwins@i` The actual macro. Note that we need to keep the twin node in `\pst@pdgr@tempnode` to correctly process `addtwin`.

```
252 \def\pstTwins@i[#1]#2#3#4#5{%
253   \begingroup%
254   \def\pst@pdgr@tempnode{#3}
255   \psset{arrows=-, linestyle=solid, angleA=90, %
256         angleB=-90}%
257   \psset{#1}%

```

The descent line from the parent to the twin node

```
258   \pstDescent{#2}{#3}%

```

And the twin lines and nodes

```
259   \ncline{#3}{#4}%
260   \lput(\pst@pdgr@mzlinepos){\pnode{pst@pdgr@tempnodeA}}%
261   \ncline{#3}{#5}%
262   \lput(\pst@pdgr@mzlinepos){\pnode{pst@pdgr@tempnodeB}}%

```

The monozygotic or qzygotic line

```
263   \ifpst@pdgr@monozygotic%
264     \ncline{pst@pdgr@tempnodeA}{pst@pdgr@tempnodeB}%
265   \else%
266     \ifpst@pdgr@qzygotic%
267       \ncline[linestyle=none]{pst@pdgr@tempnodeA}{pst@pdgr@tempnodeB}%
268       \lput(0.5){?}%
269     \fi%
270   \fi%
271   \endgroup}%

```

2.10 Tree Making Commands

`\pst@pdgr@makeTcommand` The general macro to create a tree command from the normal command

```
272 \def\pst@pdgr@makeTcommand#1{%  
273   \@namedef{T#1}{%  
274     \@ifnextchar[{\@nameuse{T#1@i}}{\@nameuse{T#1@i}[]}}%  
275   \@namedef{T#1@i}[##1]##2{%  
276     \Tr{\@nameuse{#1@i}[##1]{##2}}}%
```

And the macros

`\TpstPerson` Drawing a person

```
277 \pst@pdgr@makeTcommand{pstPerson}%
```

`\TpstAbortion` Drawing an abortion

```
278 \pst@pdgr@makeTcommand{pstAbortion}%
```

`\TpstChildless` Drawing a childlessness symbol

```
279 \pst@pdgr@makeTcommand{pstChildless}%
```

2.11 Finishing Touch

```
280 </tex>
```


References

- [1] Robin L. Bennett, Kathryn A. Steinhaus, Stefanie B. Uhrich, Corrine K. O’Sullivan, Robert G. Resta, Debra Lochner-Doyle, Dorene S. Markei, Victoria Vincent, and Jan Hamanishi. Recommendations for standardized human pedigree nomenclature. *Am. J. Hum. Genet.*, 56(3):745–752, 1995.
- [2] Peter Harper. *Myotonic Dystrophy*. W. B. Saunders, Philadelphia, third edition, 2001.
- [3] Timothy Van Zandt. *PSTricks: PostScript Macros for Generic T_EX*, March 1993. Available from CTAN at tex-archive/graphics/pstricks/obsolete/doc.
- [4] Boris Veytsman and Leila Akhmadeeva. *A Program For Automatic Pedigree Construction With pst-pdgr. User Manual and Algorithm Description*, April 2006. Available from CTAN at support/pedigree.

Change History

v0.1	command	26
General: The interface is mostly		
done	<code>\pst@pdgr@righttext</code> : Added	
	the command	26
v0.2		
General: Added new examples . . .	<code>\pstAbortion@i</code> : Changed text po-	
	sitioning	29
<code>\pst@pdgr@abovetext</code> : Added	<code>\pstPerson@i</code> : Changed text posi-	
the command	tioning	28
<code>\pst@pdgr@belowtext</code> : Added	Slightly increased brackets for	
the command	the “adopted” symbol	28
<code>\pst@pdgr@lefttext</code> : Added the		

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