We illustrate some of the advantages of diagxy over the matrix version of xy-pic. I should emphasize the fact that these defects are not in the underlying xy-pic (else they could not be repaired in diagxy, which is, after all, only a front end to xy-pic) but are actually defects of the matrix mode. If you compose the file:

\documentclass{tac}
\usepackage[matrix]{xy}
\input diagxy
\mathrmdef{Hom}

\begin{document}

\begin{verbatim}
\bfig
\morphism[A^\{B^C\} \times \{Y_Z\};]
\efig
\end{verbatim}

\begin{verbatim}
\xymatrix{A^\{B^C\} \ar[r] & X_{Y_Z}}
\end{verbatim}

\begin{verbatim}
\bfig
Atriangle[C'D';\Hom(A^{B^C},X_{Y_Z});''\]
\efig
\end{verbatim}

\begin{verbatim}
\xymatrix{&C\ar[dl]\ar[dr]\&
D\ar[rr]&&\Hom(A^{B^C},X_{Y_Z})}
\end{verbatim}

\begin{verbatim}
\bfig
\morphism<900,0>[\Hom(A,B)^\{\Hom(A',B);\Hom(f,B)\}
\efig
\end{verbatim}

\begin{verbatim}
\xymatrix{\Hom(A,B)\ar[r]^\{\Hom(f,B)\} & \Hom(A',B)}
\end{verbatim}

\begin{verbatim}
\xymatrix{\Hom(A,B)\ar[rr]^\{\Hom(f,B)\} & & \Hom(A',B)}
\end{verbatim}

(c) Michael Barr, 2009. Permission to copy for private use granted.
you will get a sequence of diagrams some in diagxy and some in xy-pic. The first pair illustrates the fact that the arrows in diagxy come out vertically centred on the whole node, not on its core element, so that having a complex superscript on one and subscript on the other leaves the central elements at different heights. Compare the two:

\[
\begin{array}{c}
A^{BC} \longrightarrow X_{YZ} \\
A^{BC} \longrightarrow X_{YZ}
\end{array}
\]

The next pair are pretty much self-explanatory. It comes as the result of the fact that the nodes are quite different sizes:

\[
\begin{array}{c}
C \\
D \longrightarrow \text{Hom}(A^{BC}, X_{YZ})
\end{array}
\]

\[
\begin{array}{c}
C \\
D \longrightarrow \text{Hom}(A^{BC}, X_{YZ})
\end{array}
\]

Xymatrix does not give fine control over horizontal spacing. You have to choose, in xy-pic, between making the second element one or two columns over from the first. In diagxy, you can adjust it as necessary.

\[
\begin{array}{c}
\text{Hom}(A, B) \xrightarrow{\text{Hom}(f,B)} \text{Hom}(A', B)
\end{array}
\]
This simple example is not convincing, but this is followed by a diagram (taken from an actual paper) in which the ability to control horizontal spacing in small units is crucial to getting the diagram on a single line. Widths of the several nodes are 525, 750, 750, 850, and 575 units, respectively:

\[
\cdots \rightarrow H^n(Y, (A^G)_V) \rightarrow H^n(Y, A^G) \rightarrow H^n(Y, (A^G)_{Y_0}) \rightarrow H^{n+1}(Y, (A^G)_V) \rightarrow \cdots \\
\cong \\
\cdots \rightarrow H^n(X; G, A_U) \rightarrow H^n(X; G, A) \rightarrow H^n(X; G, A_{X_0}) \rightarrow H^{n+1}(X; G, A_U) \rightarrow \cdots
\]

If you prefer to code diagrams by placing nodes and then arrows between them (more like xy-pic), this is also possible as illustrated by the following code that sets exactly the same diagram as the preceding.

```tex
\bfig
\node 1a(0,500)[\cdots]
\node 1b(525,500)[H^n(Y,(A^G)_V)]
\node 1c(1275,500)[H^n(Y,A^G)]
\node 1d(2025,500)[H^n(Y,(A^G)_{Y_0})]
\node 1e(2875,500)[H^{n+1}(Y,(A^G)_V)]
\node 1f(3450,500)[\cdots]
\node 2a(0,0)[\cdots]
\node 2b(525,0)[H^n(X;G,A_U)]
\node 2c(1275,0)[H^n(X;G,A)]
\node 2d(2025,0)[H^n(X;G,A_{X_0})]
\node 2e(2875,0)[H^{n+1}(X;G,A_U)]
\node 2f(3450,0)[\cdots]
\arrow[1a'1b;]
\arrow[1b'1c;]
\arrow[1c'1d;]
\arrow[1d'1e;]
\arrow[1e'1f;]
\arrow[2a'2b;]
\arrow[2b'2c;]
\arrow[2c'2d;]
\arrow[2d'2e;]
\arrow[2e'2f;]
\arrow[r][1b'2b;\cong]
\arrow[1c'2c;]
\efig
```
January 2009