Modern

Latin

BachoTeX 2018 — Hans Hagen

Why oh why

- In ConTEXt we have a mechanism to apply effects to a glyph stream.

- An active user on the ConTEXt mailing list wondered if that could be applied to specific fonts.

- The particular interest concerned the possibility to bolden fonts.

- I don't really like effects and not all fonts are suitable for it.

What are effects

Normal effects are implemented using the 'effects' mechanism, which already dates way back in MkII times and of course is also available for MkIV.

```
\defineeffect
   [outer]
   [alternative=outer,
    rulethickness=1.25pt]

effect \starteffect[outer]effect\stopeffect
```

effect effect **effect**

effect effect effect

effect effect effect

inner   outer   both

How tricky is this

- Of course the only way to deal with this nicely is by using runtime created virtual fonts.

- So called pdf literals can interfere badly with font switches at the pdf level and are therefore very inefficient.

- In order to properly support effects at the font level, we need to be able to inject the right pdf code in a more clever way.

- Two new keys were added to the font file definition table: `width` and `mode`. When set these inject a pdf line width operation and trigger the right rendering mode (backend).

What interface do we need

```
\definefontfeature[effect-1][effect={width=0.8}]
\definefontfeature[bbox]     [boundingbox=frame]

\definefont
  [EffectiveFont]
  [BenchMark*default,effect-1,bbox @ 12pt]
```

```
\definefontfeature[effect-2][effect={width=1.1,wdelta=1.20}]
\definefontfeature[effect-3][effect={width=1.1,wdelta=1.80}]

\definefont
   [EffectiveFontA]
   [BenchMark*default,effect-2 @ 12pt]

\definefont
   [EffectiveFontB]
   [BenchMark*default,effect-3 @ 12pt]
```

effect effect

Can we do better

- This is still not good enough so next came playing with extended shapes. This is an old feature inherited from PostScript times and pdfTeX.

- The LuaTeX backend is very efficient with this kind of trickery and combines it with font scaling.

- It was trivial to add a similar scaling in the vertical direction.

```
\definefontfeature[effect-4]
  [effect={width=0.5,wdelta=1.5}]

\definefontfeature[effect-5]
  [effect={width=0.5,wdelta=1.5,extend=1.2}]

\definefont
  [EffectiveFontA]
  [BenchMark*default,effect-4 @ 12pt]

\definefont
  [EffectiveFontB]
  [BenchMark*default,effect-5 @ 12pt]
```

```
\definefontfeature[effect-6]
  [effect={width=0.5,wdelta=1.50}]

\definefontfeature[effect-7]
  [effect={width=0.5,wdelta=1.50,squeeze=1.2}]

\definefont
  [EffectiveFontA]
  [BenchMark*default,effect-6 @ 12pt]

\definefont
  [EffectiveFontB]
  [BenchMark*default,effect-7 @ 12pt]
```

effect effect

How about math

- I never really needed this kind of trickery but it might be handy for bold math in titles.

- But math is kind of special as it has extensibles, uses rules and is controlled by math parameters.

- Math parameters are global for a formula so that doesn't work out well for mixed families using fonts with different design parameters.

```
\switchtobodyfont[modern]

$\sqrt{\frac{\frac{1}{a}}{\frac{2}{b}}}$

\switchtobodyfont[modernlatin]

$\mr \sqrt{\frac{\frac{1}{a}}{\frac{2}{b}}}$
$\mb \sqrt{\frac{\frac{1}{a}}{\frac{2}{b}}}$
```

$$\sqrt{\dfrac{\frac{1}{a}}{\frac{2}{b}}} \qquad \sqrt{\dfrac{\frac{1}{a}}{\frac{2}{b}}} \qquad \sqrt{\dfrac{\frac{1}{a}}{\frac{2}{b}}}$$
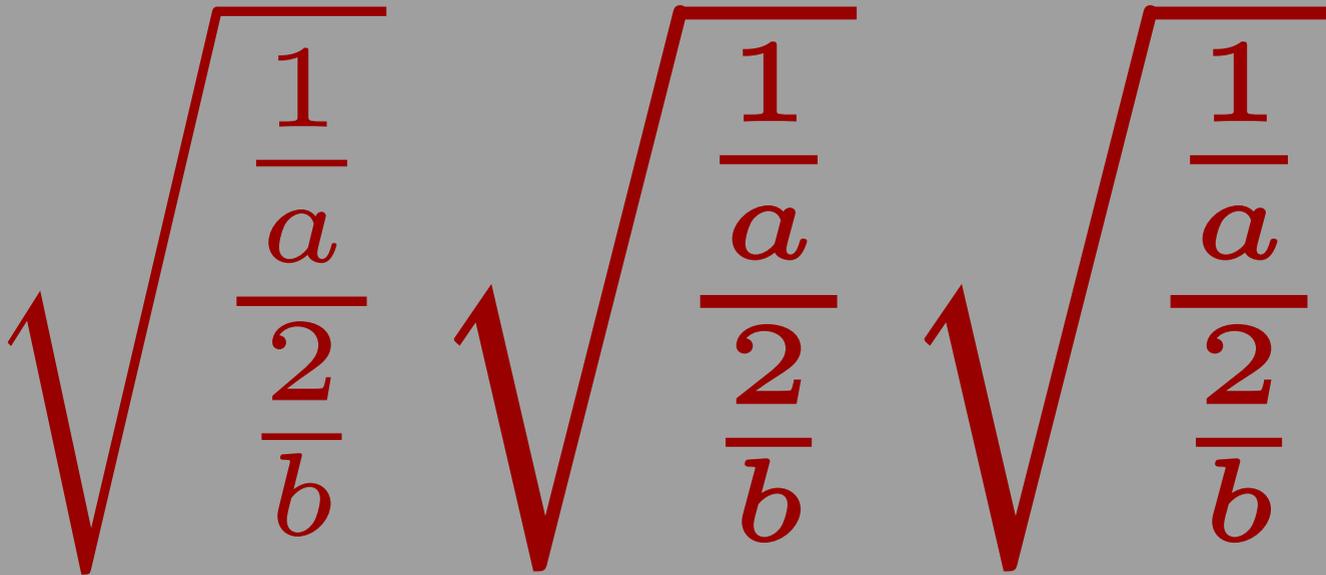
latinmodern   modernlatin   modernlatin

Is it useful

- For reading on a different medium than paper a bit bolder font often works better. This is a normal Latin Modern.

- Here we use the `modernlatin` For reading on a different medium than paper a bit bolder font often works better.

- In my opinion a slightly bolder Latin Modern looks a bit more modern, but that's of course just an opinion.

- I'm not sure if and when I will use this new trickery; maybe to compensate the lack of bold math fonts.

- Performance wise there is no penalty. File don't get larger. Rendering seems to be somewhat slower.

- In the end it's probably just another example of feature creep or TeX hobbyism.

Kerning

- To what extent do we need to compensate dimensions in order to get the kerning acceptable.

- Messing around with font features is fragile because there is not much consistency in how these are organized.
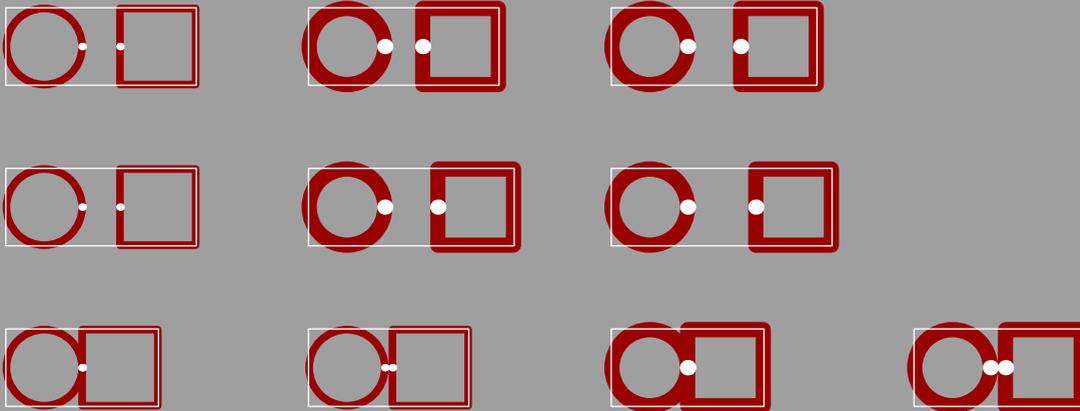
Ligatures

- Ligatures are even less predictable so this is why we cannot apply too much effect.

- There can be artifacts due to the way characters are combined (like in Latin Modern).

fist effe **fist effe**

fist effe **fist effe**

fist effe **fist effe**

Finetuning

```
\definefontfeature[lm-bald]
   [effect={width=0.25,effect=both}]
\definefontfeature[pg-bald]
   [effect={width=0.25,effect=both}]
\definefontfeature[dj-bald]
   [effect={width=0.35,effect=both}]

\definefontfeature[lm-bold]
   [effect={width=0.25,hdelta=0,ddelta=0,effect=both,
     extend=1.10}]

\definefontfeature[pg-bold]
   [effect={width=0.25,hdelta=0,ddelta=0,effect=both,
     extend=1.00}]

\definefontfeature[dj-bold]
   [effect={width=0.35,hdelta=0,ddelta=0,effect=both,
     extend=1.05}]
```

	modern	**pagella**	**dejavu**
`\tfd`	ABC	ABC	ABC
`\..bald`	ABC	ABC	ABC
`\bfd`	ABC	ABC	**ABC**
`\..bold`	ABC	ABC	ABC

Pagella

```
\definefontfeature
  [pg-fake-1]
  [effect={width=0.25,effect=both}]

\definefontfeature
  [pg-fake-2]
  [effect={width=0.25,hdelta=0,ddelta=0,effect=both}]

\definefont[pgregular]   [Serif*default]
\definefont[pgbold]      [SerifBold*default]
\definefont[pgfakebolda][Serif*default,pg-fake-1]
\definefont[pgfakeboldb][Serif*default,pg-fake-2]

\definecolor[color-pgregular]   [t=.5,a=1,r=.6]
\definecolor[color-pgbold]      [t=.5,a=1,g=.6]
\definecolor[color-pgfakebolda][t=.5,a=1,b=.6]
\definecolor[color-pgfakeboldb][t=.5,a=1,r=.6,g=.6]
```

ôëpş

regular

ôëpş

bold

ôëpş

fakebolda

ôëpş

fakeboldb

ôëpş ôëpş

bold over regular   fakebolda over regular

ôëpş ôëpş

fakeboldb over regular   fakeboldb over bold

ôëpş ôëpş

fakeboldb over fakebolda   all four overlayed

London Grammar

regular

London Grammar

bold

London Grammar

fakebolda

London Grammar

fakeboldb

London Grammar

bold over regular

London Grammar

fakebolda over regular

London Grammar

fakeboldb over regular

London Grammar

fakeboldb over bold

London Grammar

fakeboldb over fakebolda

London Grammar

all four overlayed

Arabic

```
\definefontfeature
  [bolden-arabic-1]
  [effect={width=0.4}]

\definefontfeature
  [bolden-arabic-2]
  [effect={width=0.4,effect=outer}]

\definefontfeature
  [bolden-arabic-3]
  [effect={width=0.5,wdelta=0.5,ddelta=.2,hdelta=.2,factor=.1}]
```

قَالَ عَلِيُّ بْنُ أَبِي طَالِبٍ لِكَاتِبِهِ عُبَيْدِ الله بْنِ أَبِي رَافِعٍ: أَلْقِ دَوَاتَكَ، وَ أَطِلْ جِلْفَةَ قَلَمِكَ، وَ فَرِّجْ بَيْنَ السُّطُورِ، وَ قَرْمِطْ بَيْنَ الْحُرُوفِ؛ فَإِنَّ ذَلِكَ أَجْدَرُ بِصَبَاحَةِ الْخَطِّ.

قَالَ عَلِيُّ بْنُ أَبِي طَالِبٍ لِكَاتِبِهِ عُبَيْدِ اللهِ بْنِ أَبِي رَافِعٍ : أَلِقْ دَوَاتَكَ ، وَ أَطِلْ جِلْفَةَ قَلَمِكَ ، وَ فَرِّجْ بَيْنَ السُّطُورِ ، وَ قَرْمِطْ بَيْنَ الْحُرُوفِ ؛ فَإِنَّ ذَلِكَ أَجْدَرُ بِصَبَاحَةِ الْخَطِّ .

قَالَ عَلِيُّ بْنُ أَبِي طَالِبٍ لِكَاتِبِهِ عُبَيْدِ اللهِ بْنِ أَبِي رَافِعٍ : أَلِقْ دَوَاتَكَ ، وَ أَطِلْ جِلْفَةَ قَلَمِكَ ، وَ فَرِّجْ بَيْنَ السُّطُورِ ، وَ قَرْمِطْ بَيْنَ الْحُرُوفِ ؛ فَإِنَّ ذَلِكَ أَجْدَرُ بِصَبَاحَةِ الْخَطِّ .

قَالَ عَلِيُّ بْنُ أَبِي طَالِبٍ لِكَاتِبِهِ عُبَيْدِ اللهِ بْنِ أَبِي رَافِعٍ : أَلِقْ دَوَاتَكَ ، وَ أَطِلْ جِلْفَةَ قَلَمِكَ ، وَ فَرِّجْ بَيْنَ السُّطُورِ ، وَ قَرْمِطْ بَيْنَ الْحُرُوفِ ؛ فَإِنَّ ذَلِكَ أَجْدَرُ بِصَبَاحَةِ الْخَطِّ .

Marks and cursive

- Marks are tricky because they can be anchored at any location and we can only guess what should be done.

- Cursive connections still need to connect and we don't know in advance how shapes overlap.
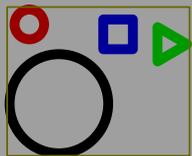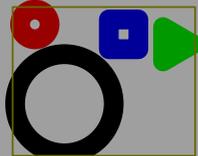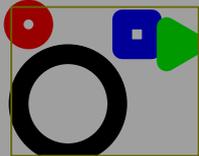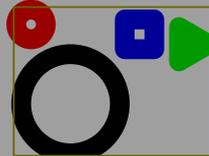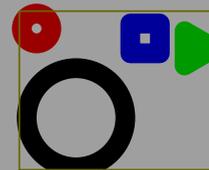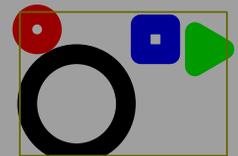
original   instance   mark x only   mark + mkmk x only   mark + mkmk x and y   mark + mkmk x and -y
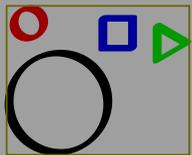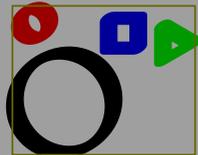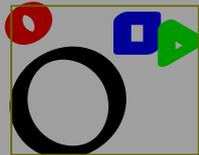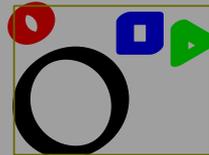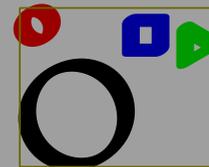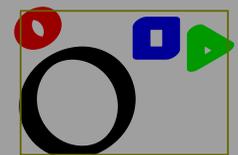
original   instance   mark x only   mark + mkmk x only   mark + mkmk x and y   mark + mkmk x and -y

Radicals and such

Radicals are constructed using rules and extensible characters. Especially the rules need to be adapted.

```
$\mr \darkblue   \MathSample \quad
 \mb \darkgreen \MathSample $
```

$$2 \times \sqrt{\dfrac{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}}$$

```
\dostepwiserecurse {1} {30} {5} {
  $
    \mr \sqrt{\blackrule[width=2mm,height=#1mm,color=darkblue]}
    \quad
    \mb \sqrt{\blackrule[width=2mm,height=#1mm,color=darkgreen]
      }
  $
}
```

$$\sqrt{\frac{1}{x}}$$
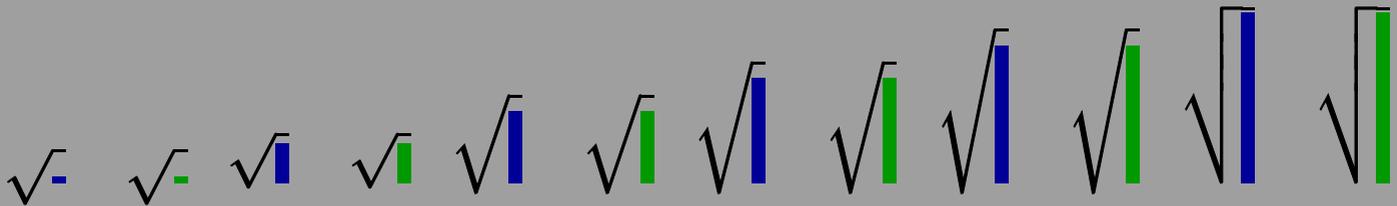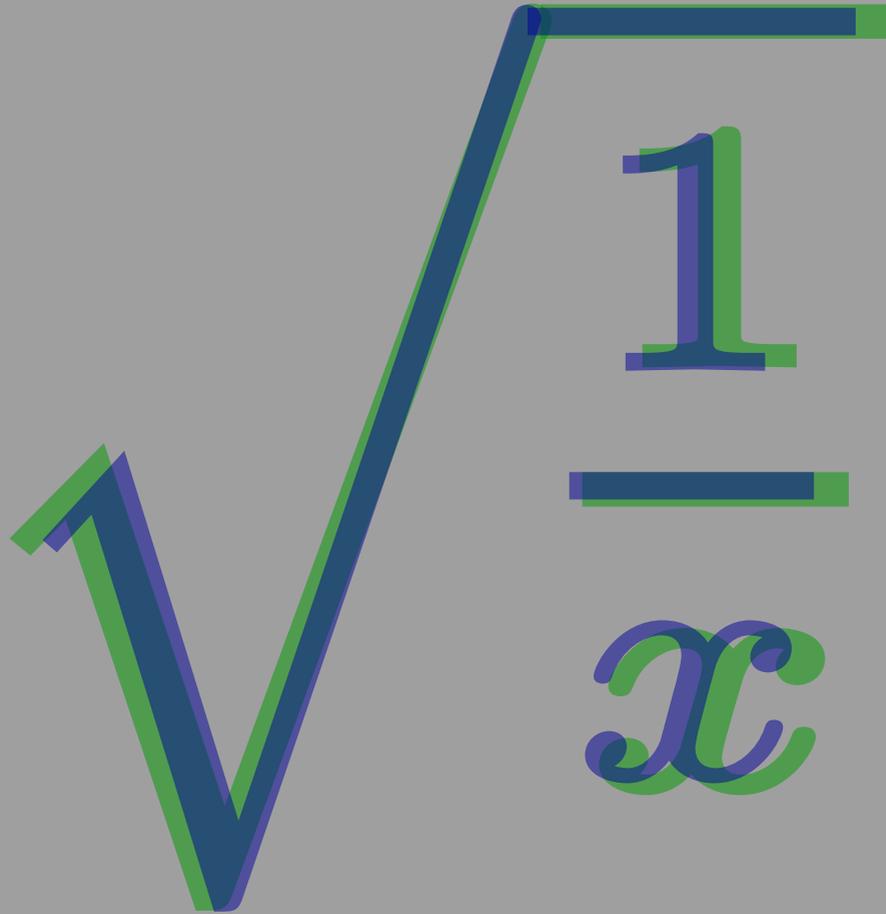
$$2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}}$$

dejavu: 2 2 2 **2 2 2**   pagella: 2 2 2 **2 2 2**   termes: 2 2 2 **2 2 2**

$$2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 \times \sqrt{\dfrac{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\dfrac{\sqrt{2}}{\sqrt{2}}}}}$$

bonum: 2 2 2 **2 2 2**   schola: 2 2 2 **2 2 2**   cambria: 2 2 2 **2 2 2**

```
\definefontfeature
  [boldened-30]
  [effect={width=0.3,extend=1.15,squeeze=0.985,%
    delta=1,hdelta=0.225,ddelta=0.225,vshift=0.225}]

\definefontfeature
  [boldened-30]
  [effect={width=0.30,auto=yes}]
```

An application

```
\definehead [mysectiona] [section]
\definehead [mysectionb] [mysectiona]

\setuphead
  [mysectiona]
  [style=\tfc,
   color=darkblue,
   before=\blank,
   after=\blank]

\setuphead
  [mysectionb]
  [style=\bfc,
   color=darkred]

\mysectiona{Regular\quad$\MathSample\quad\mb\MathSample$}
\mysectionb{Bold    \quad$\MathSample\quad\mb\MathSample$}
```

1 Regular $\qquad 2 + \sqrt{\dfrac{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}} \qquad 2 + \sqrt{\dfrac{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}}$

2 Bold $\qquad \mathbf{2 + \sqrt{\dfrac{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}}} \qquad \mathbf{2 + \sqrt{\dfrac{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}{\sqrt{\frac{\sqrt{2}}{\sqrt{2}}}}}}$

Take this kiss upon the brow!
And, in parting from you now,
Thus much let me avow —
You are not wrong, who deem
That my days have been a dream;
Yet if hope has flown away
In a night, or in a day,
In a vision, or in none,
Is it therefore the less gone?
All that we see or seem
Is but a dream within a dream.

I stand amid the roar
Of a surf-tormented shore,
And I hold within my hand
Grains of the golden sand —
How few! yet how they creep
Through my fingers to the deep,
While I weep — while I weep!
O God! can I not grasp
Them with a tighter clasp?
O God! can I not save
One from the pitiless wave?
Is all that we see or seem
But a dream within a dream?