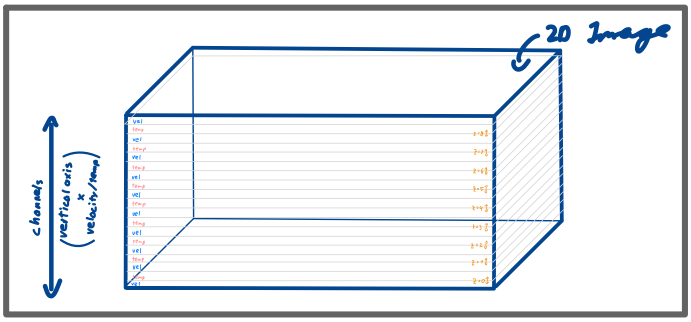
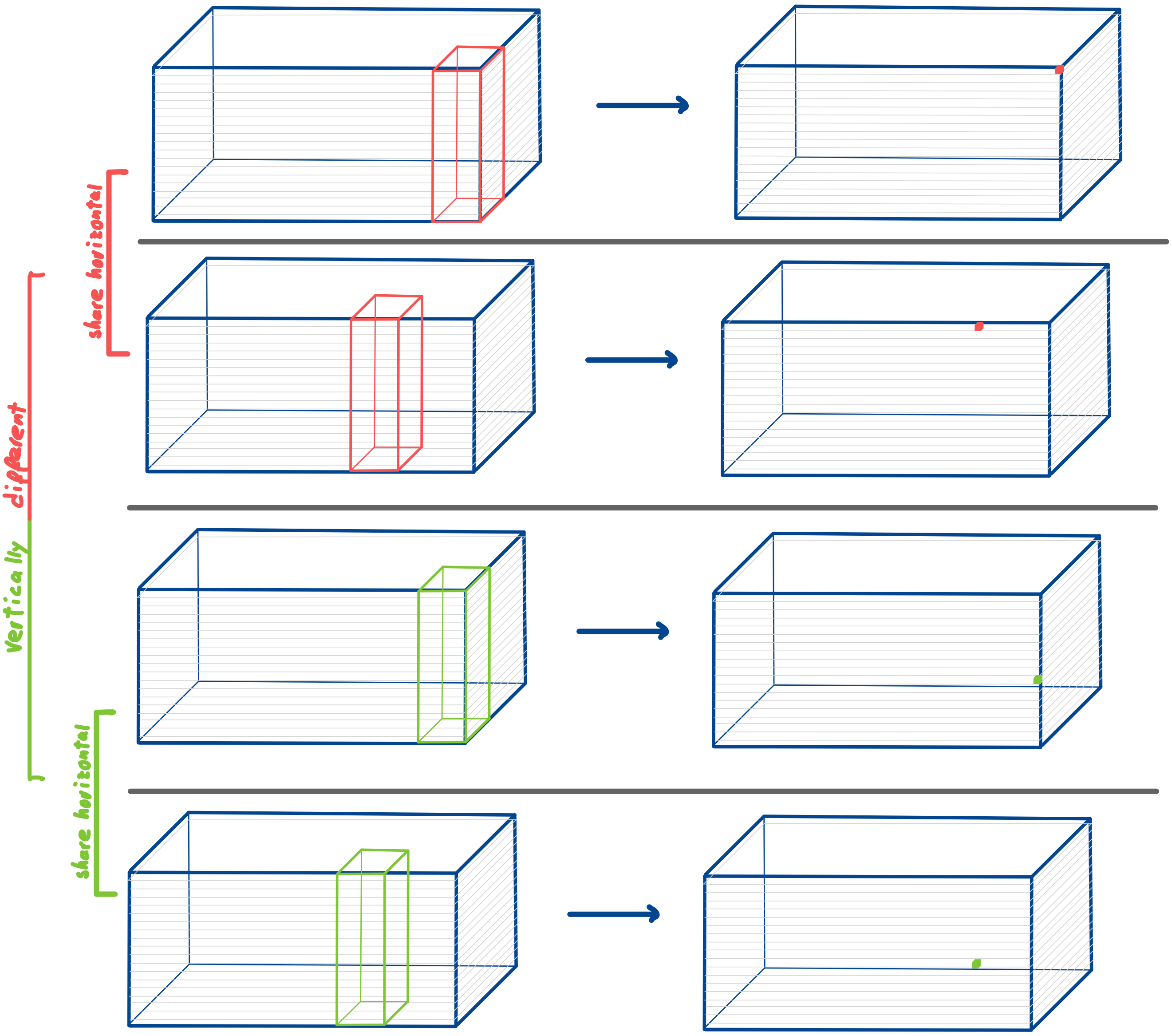
Standard 2D Conv / G-Conv

! uses full height !

-> useless (only neighborhood relevant)
-> too many resources



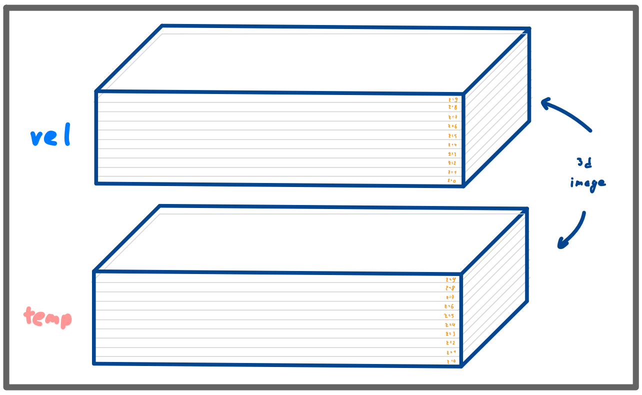


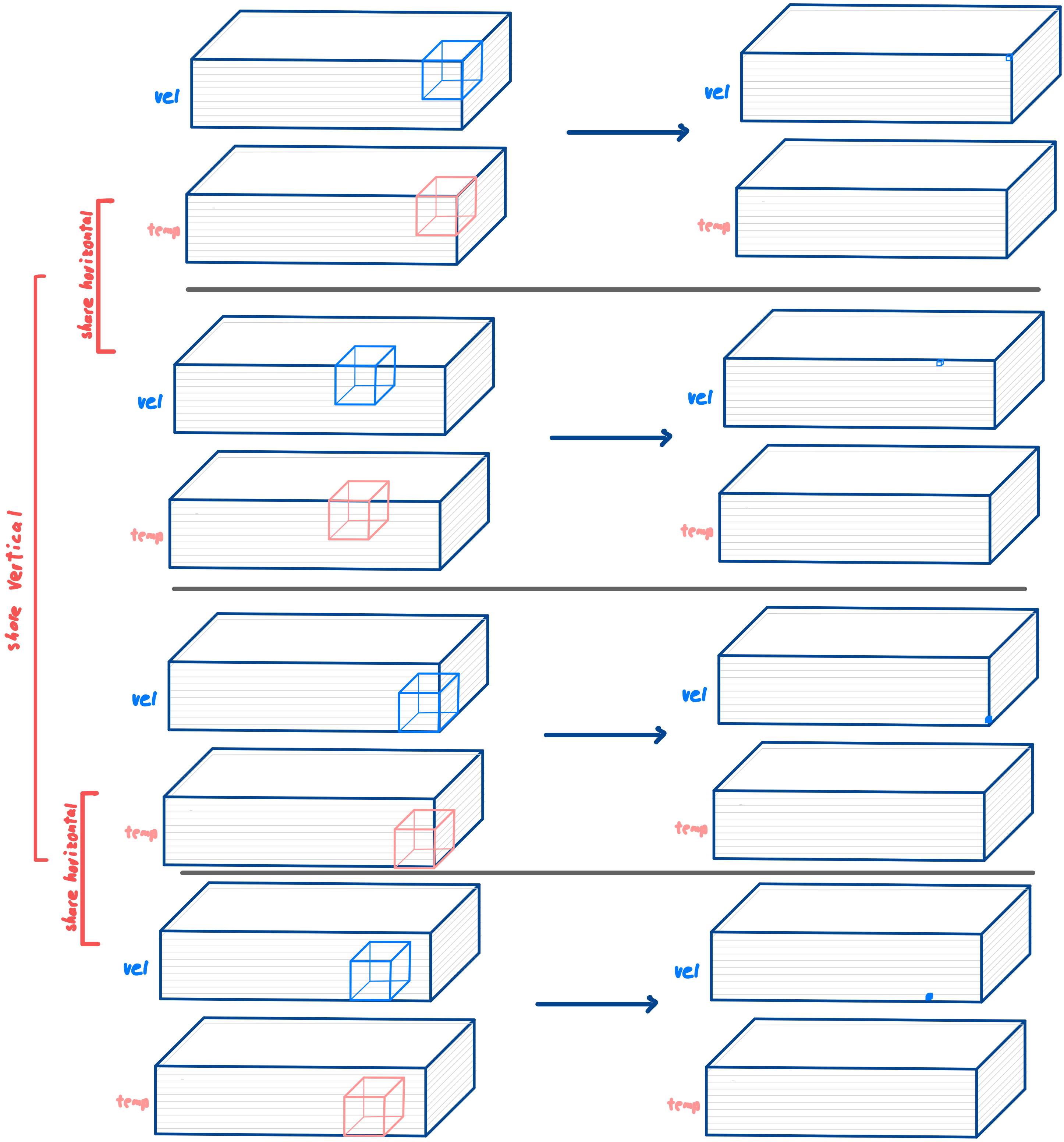
(+) approach ensures different weights for velocity and temperature

Standard 3D Conv / G-Conv

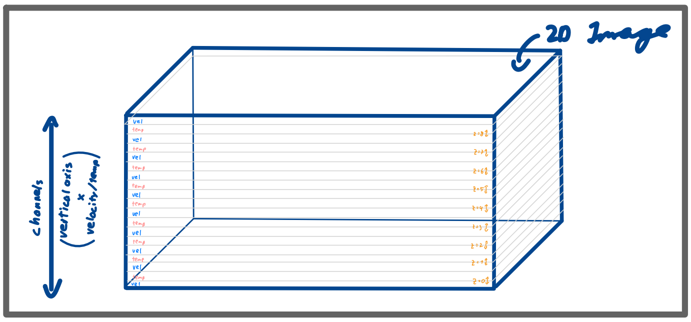
! Vertical translation !

-> we only have horizontal translation equivariance

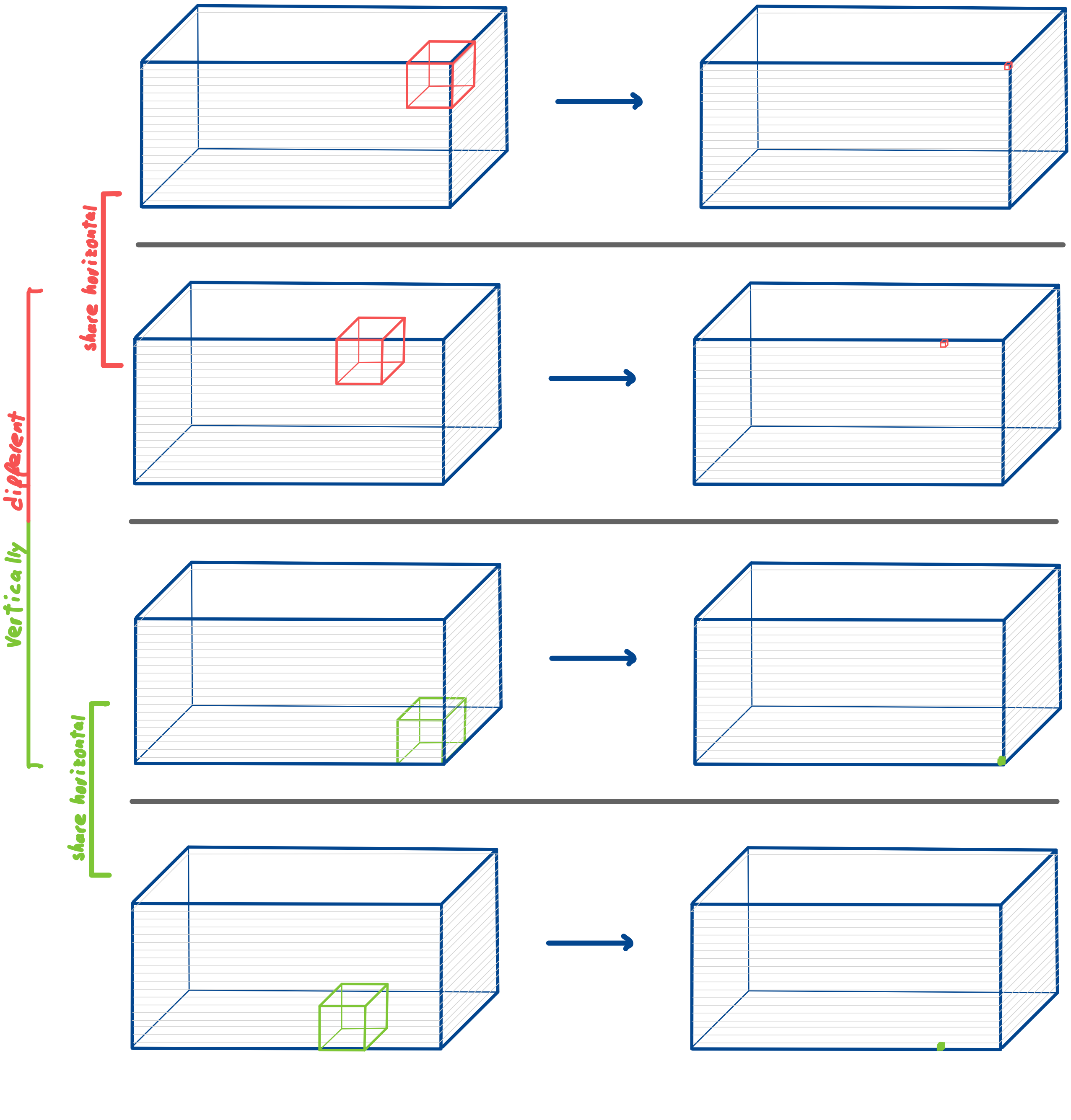




What we need

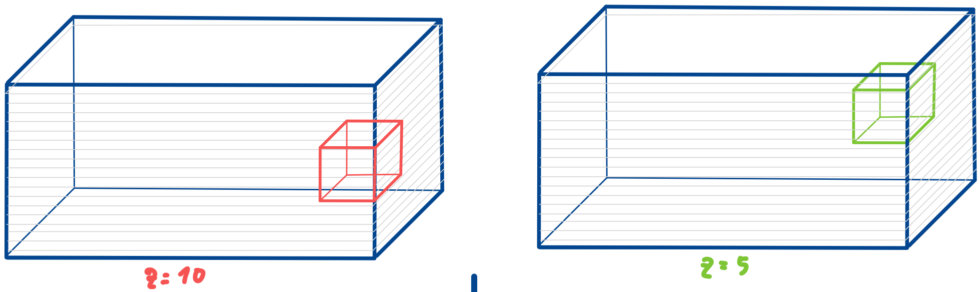


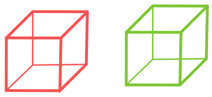
2D Image
channels
(vertical axis x velocity/temp)
vel
temp
z=8
z=7
z=6
z=5
z=4
z=3
z=2
z=1
z=0



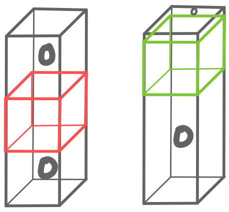
share horizontal
different
vertically
share horizontal

What we want



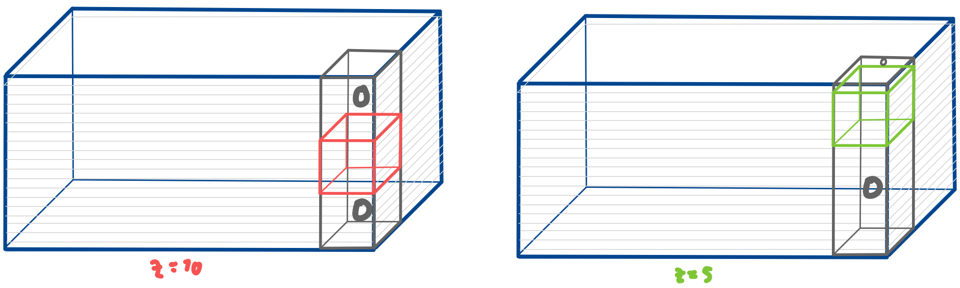


Learned Parameters



zero padded

2D Conv



Filterbank : $k \times k \times k \times c_i \times \overbrace{(h-(k-1))}^{h_{out}} \cdot c_o$

Padded Filterbank : $k \times k \times h \times c_i \times (h-(k-1)) \cdot c_o$

→ convolve input : $[x, y, h \cdot c_{in}]$ with filter : $[k, k, h \cdot c_{in}, h_{out} \cdot c_{out}]$

For Big Systems