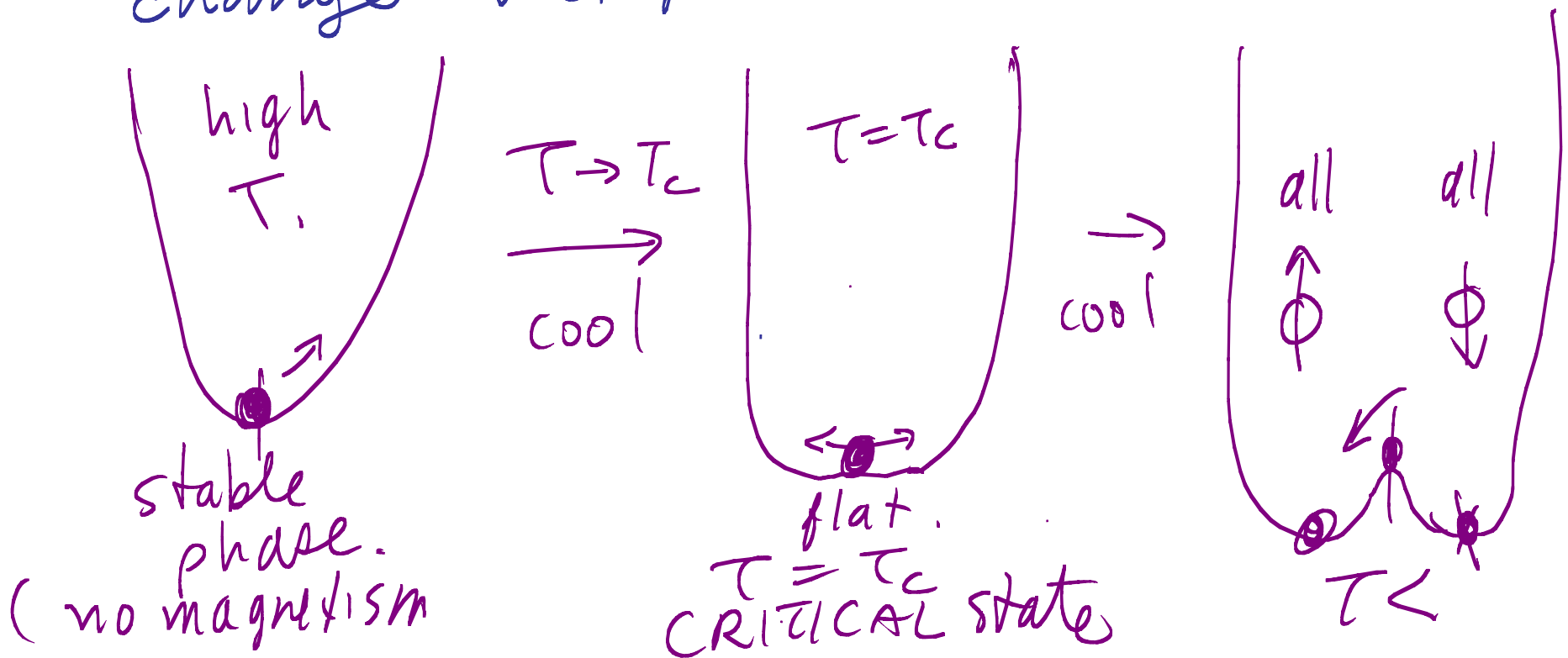
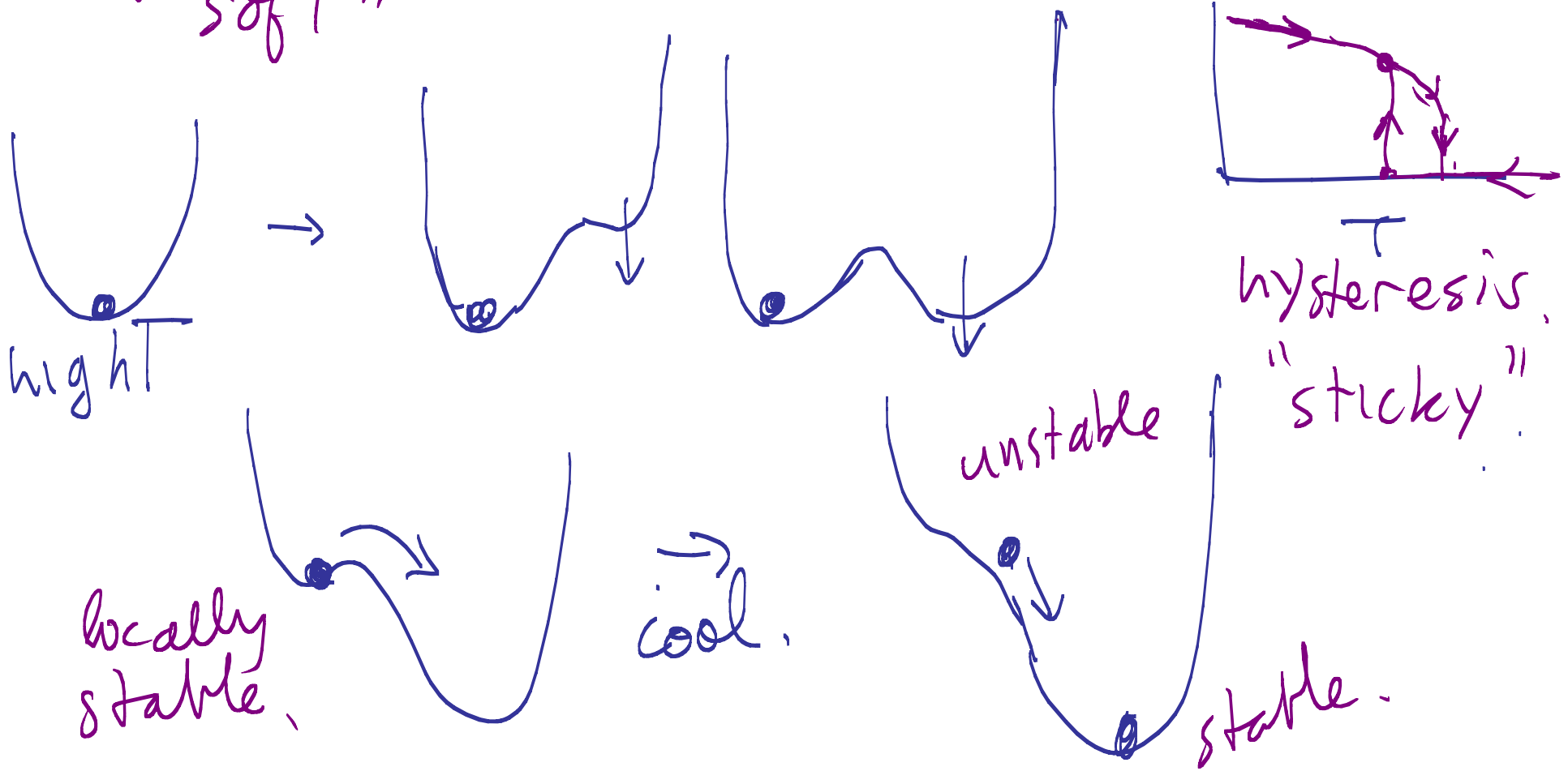


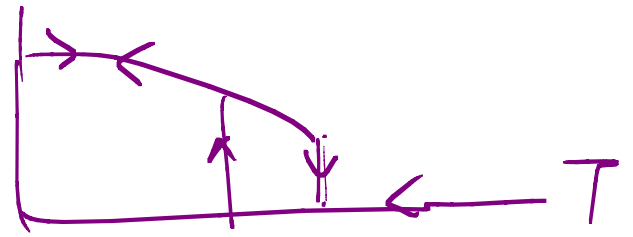
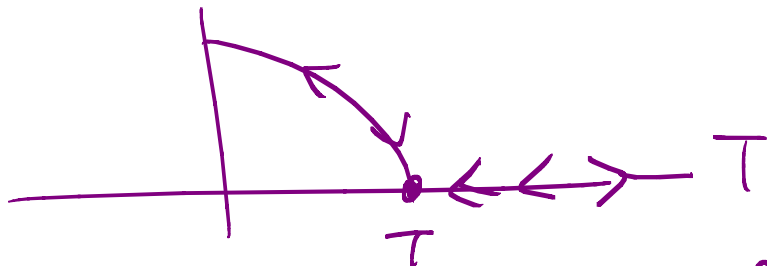
Emergence of "phases" in equilibrium system,  
 gas  $\rightarrow$  liquid.  
 change temperature,



critical state has large fluctuations  
"soft"



# Types of bifurcations



Equilibrium under "slowly" changing external conditions (Temperature)

Non-equilibrium "phase transitions"

→ "pattern formation"

→ drive system away from equil.

— becomes unstable —

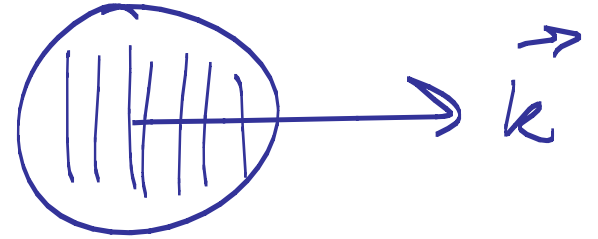
— a "pattern" can emerge at sharp bifurcation.

ORDER can appear suddenly.

macroscopic organization  
emerges. — "pattern"

patterns tend to be "generic"  
— seen across many systems.

STRIPES



periodic symmetry breaking  
in one direction

— clouds etc.

Drive harder → pattern dynamics  
defects appear — sustained

"defect chaos".

— push harder → "turbulence"  
structureless motion.  
— don't notice this state.

— see web for millions of  
no pattern.  
pictures. . . .