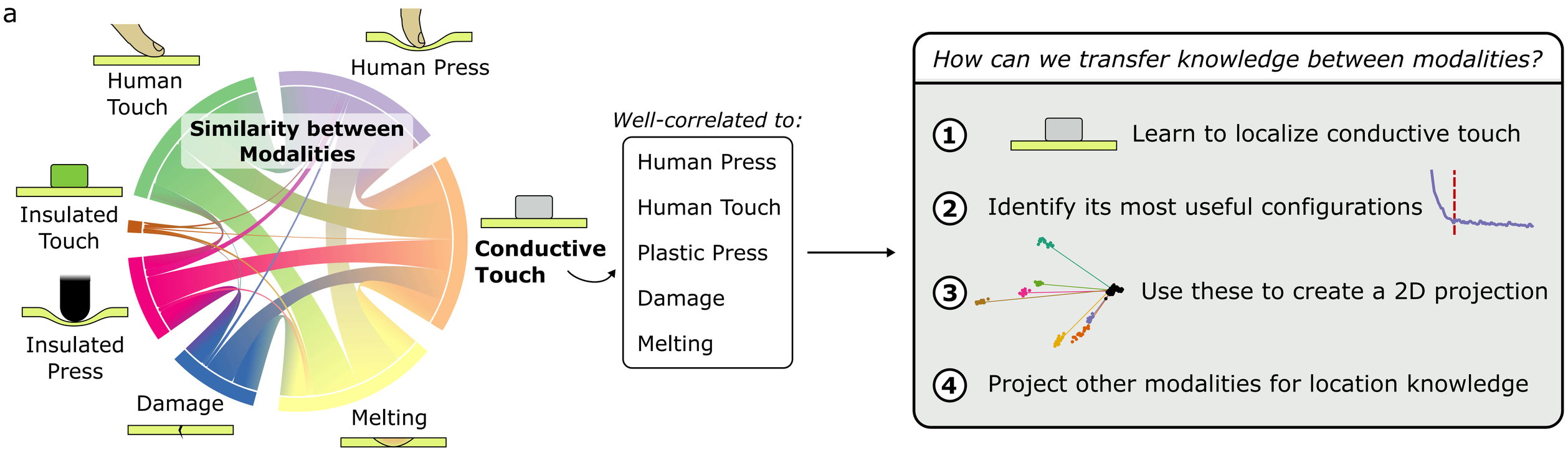
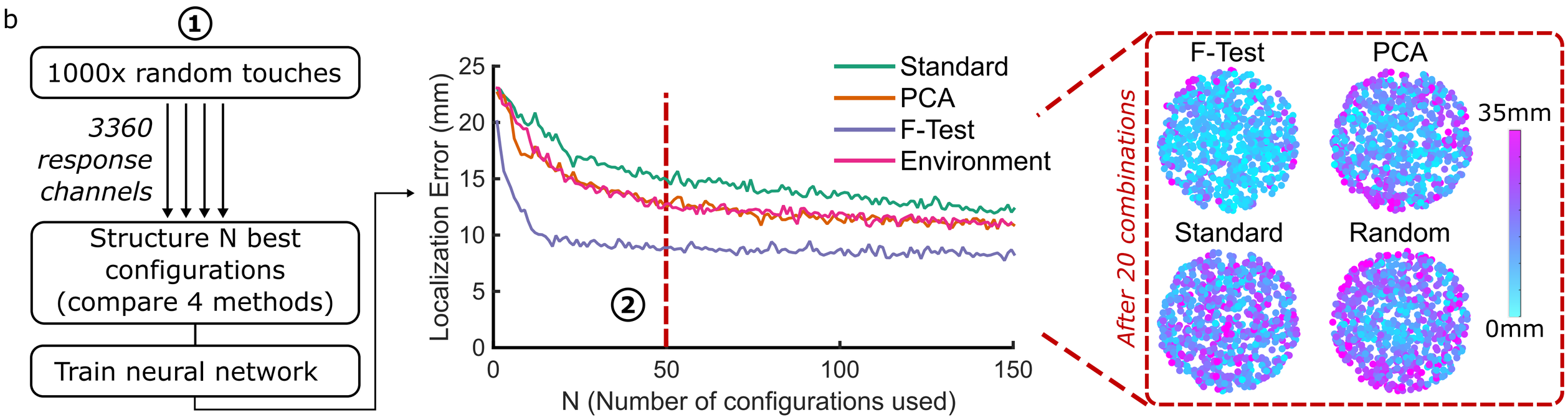
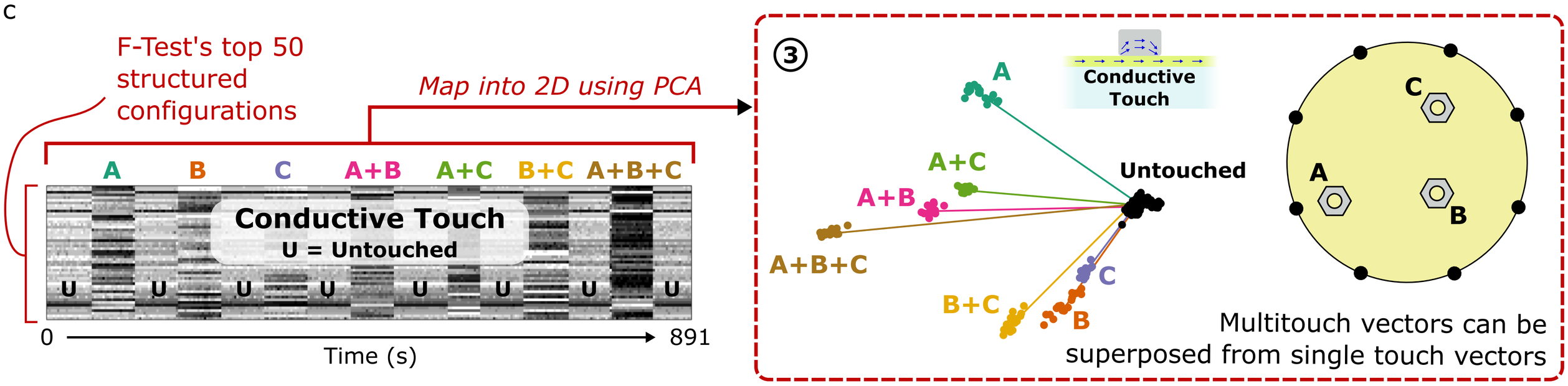
a


Human Touch
Human Press
Similarity between Modalities
Insulated Touch
Insulated Press
Damage
Melting
Conductive Touch
Well-correlated to:
Human Press
Human Touch
Plastic Press
Damage
Melting
How can we transfer knowledge between modalities?
1 Learn to localize conductive touch
2 Identify its most useful configurations
3 Use these to create a 2D projection
4 Project other modalities for location knowledge

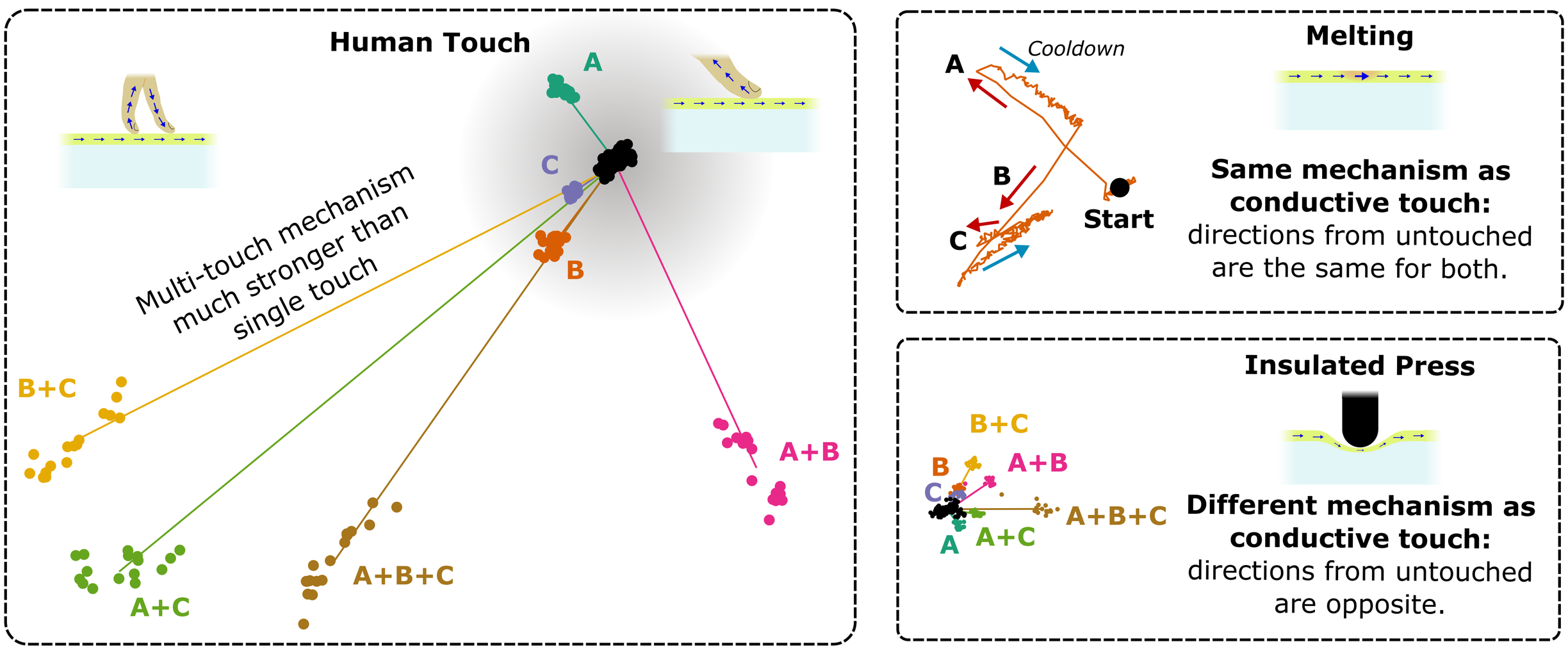
b


1
1000x random touches
3360 response channels
Structure N best configurations (compare 4 methods)
Train neural network
Localization Error (mm)
N (Number of configurations used)
Standard
PCA
F-Test
Environment
2
After 20 combinations
F-Test
PCA
Standard
Random
35mm
0mm

c


F-Test's top 50 structured configurations
Map into 2D using PCA
A
B
C
A+B
A+C
B+C
A+B+C
Conductive Touch
U = Untouched
U
0
891
Time (s)
3
Conductive Touch
Untouched
Multitouch vectors can be superposed from single touch vectors

d


4 Use conductive touch's mapping to visualize unseen modalities
Human Touch
Multi-touch mechanism much stronger than single touch
A
B
C
A+B
A+C
B+C
A+B+C
Melting
Cooldown
Start
Same mechanism as conductive touch:
directions from untouched are the same for both.
Insulated Press
Different mechanism as conductive touch:
directions from untouched are opposite.