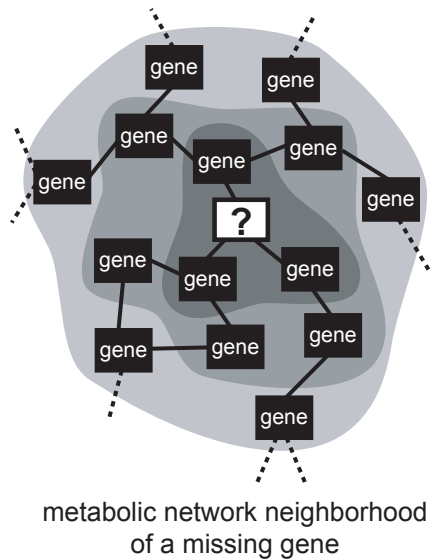
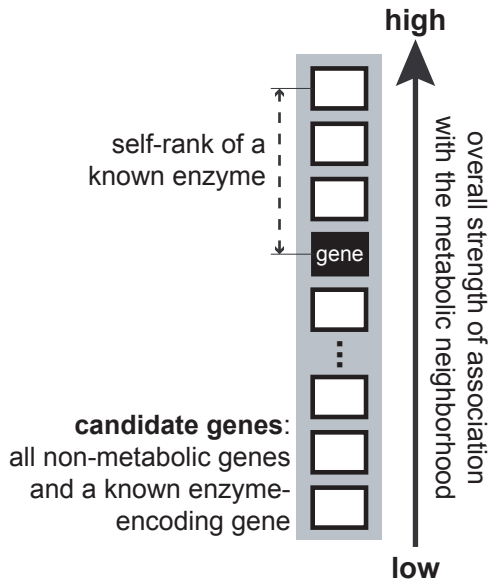


a. missing gene problem



b. self-rank validation test



gene known enzyme-encoding gene

? missing metabolic gene

□ non-metabolic gene