MODULARITY

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COHESION

HOW MUCH ARE THE PARTS IN A MODULE RELATED WITH EACH OTHER?

Functional cohesion

The module is self-complete

Sequential cohesion

Clear input-output relationship with other modules

Communication cohesion

Communication channel between modules

FEW MORE TYPES OF COHESION

PROCEDURAL COHESION

Execute code in a particular order

TEMPORAL COHESION

Timing dependences

LOGICAL COHESION

All the functions have the same function

COINCIDENTAL COHESION

LCOM

LACK OF COHESION OF METHODS

$$LCOM = \begin{cases} P - Q, \text{ if } P > Q \\ 0 \end{cases}$$

- **P** Number of method pairs that do not access a common variable
- **Q** Number of method pairs that access one common variable
- **LCOM** Higher it is, lower the cohesion.

COUPLING

Afferent coupling	Number of incoming edges
Efferent coupling	Number of outgoing edges

Abstractness and Instability

$$abstractness(A) = \frac{\sum m_a}{\sum m_b}$$

ABSTRACT ELEMENTS

CONCRETE ELEMENTS

Both should be <= 1

$$instability(I) = \frac{C^e}{C^e + C^a}$$

EFFERENT

AFFERENT

$$\sqrt{2}D = |A + I - 1|$$ DISTANCE METRIC

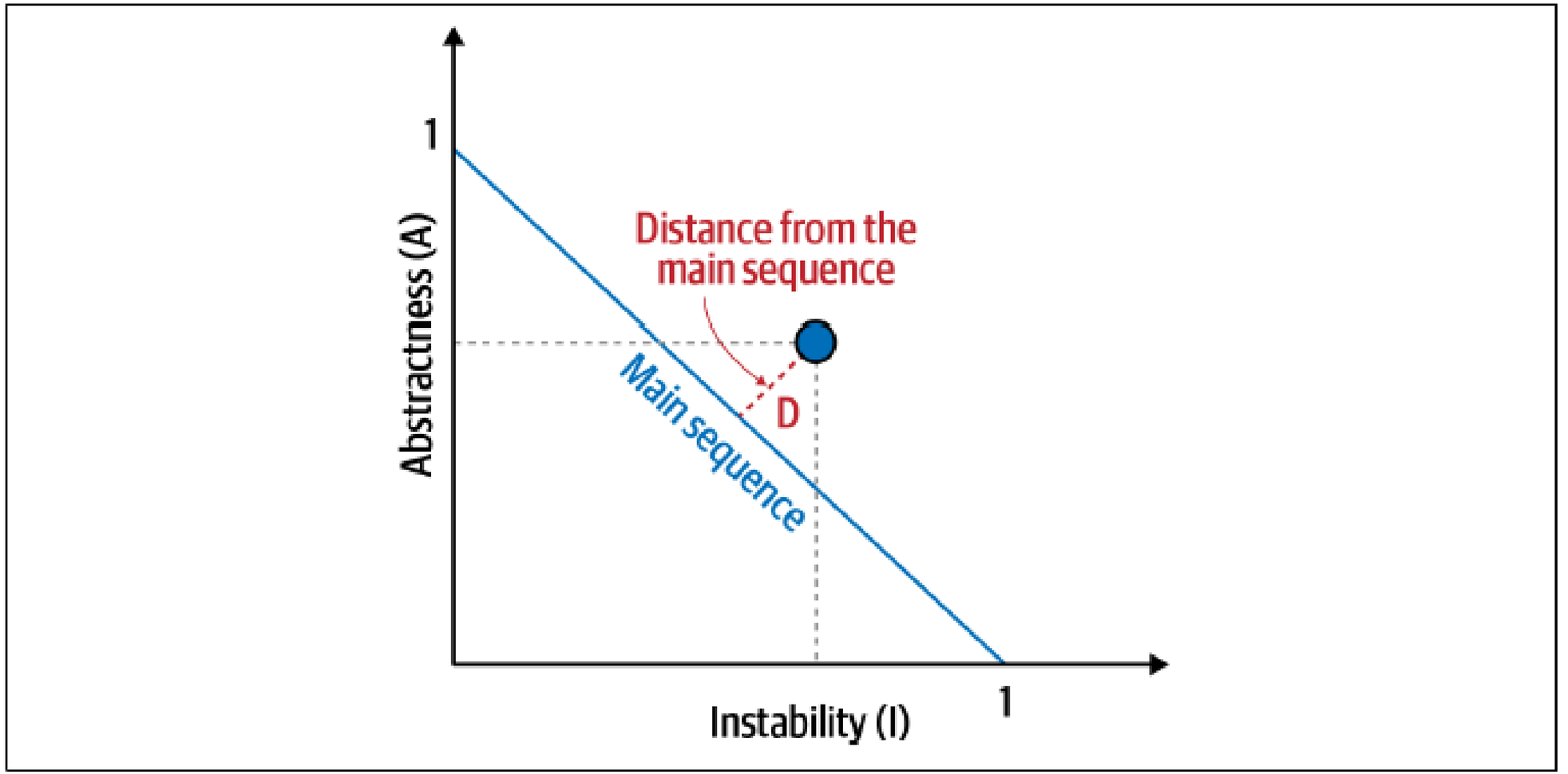
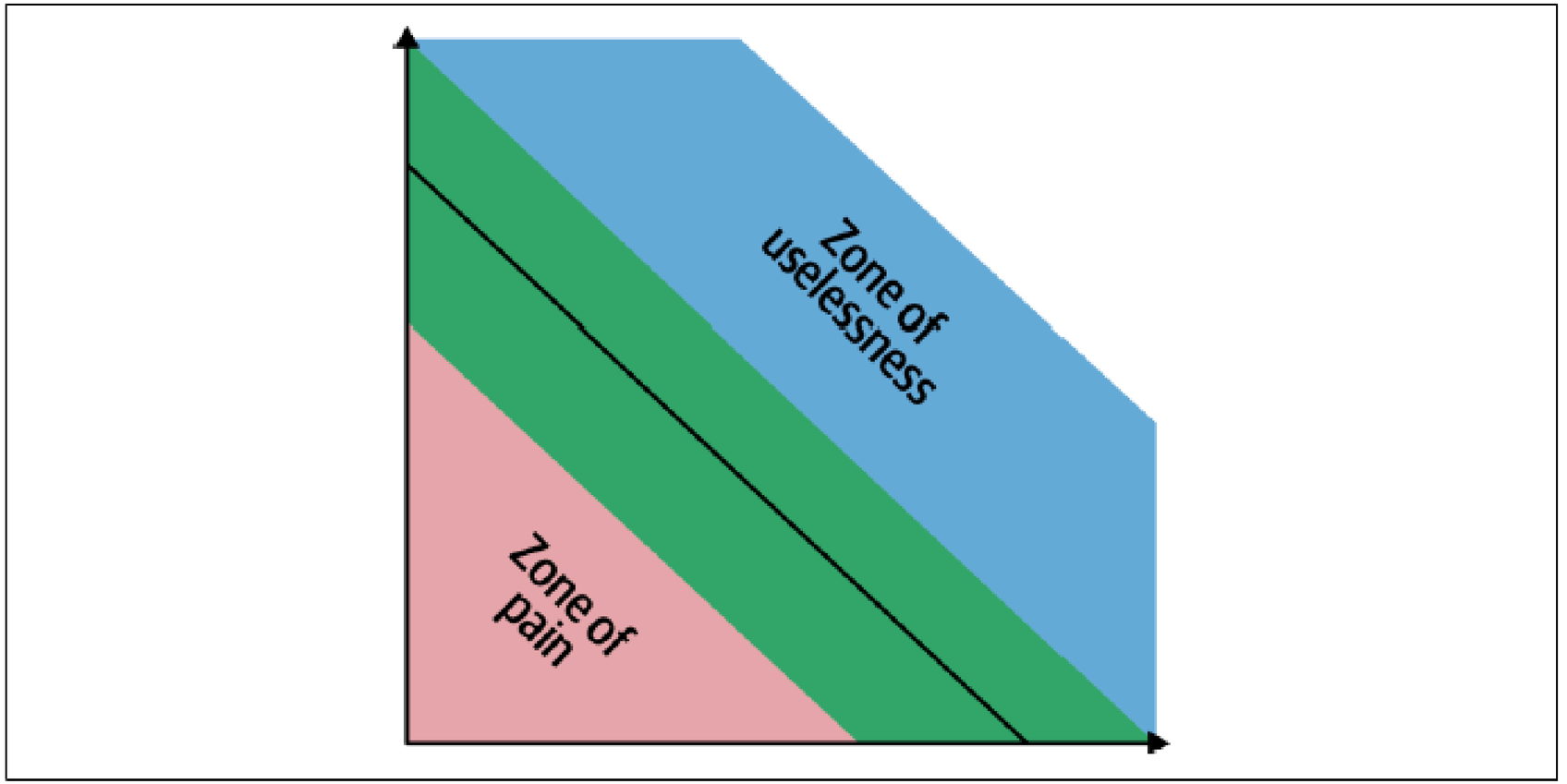


Figure 3-3. Normalized distance from the main sequence for a particular class


Zone of uselessness
Zone of pain

CONNASCENCE

ABSTRACTNESS AND INSTABILITY

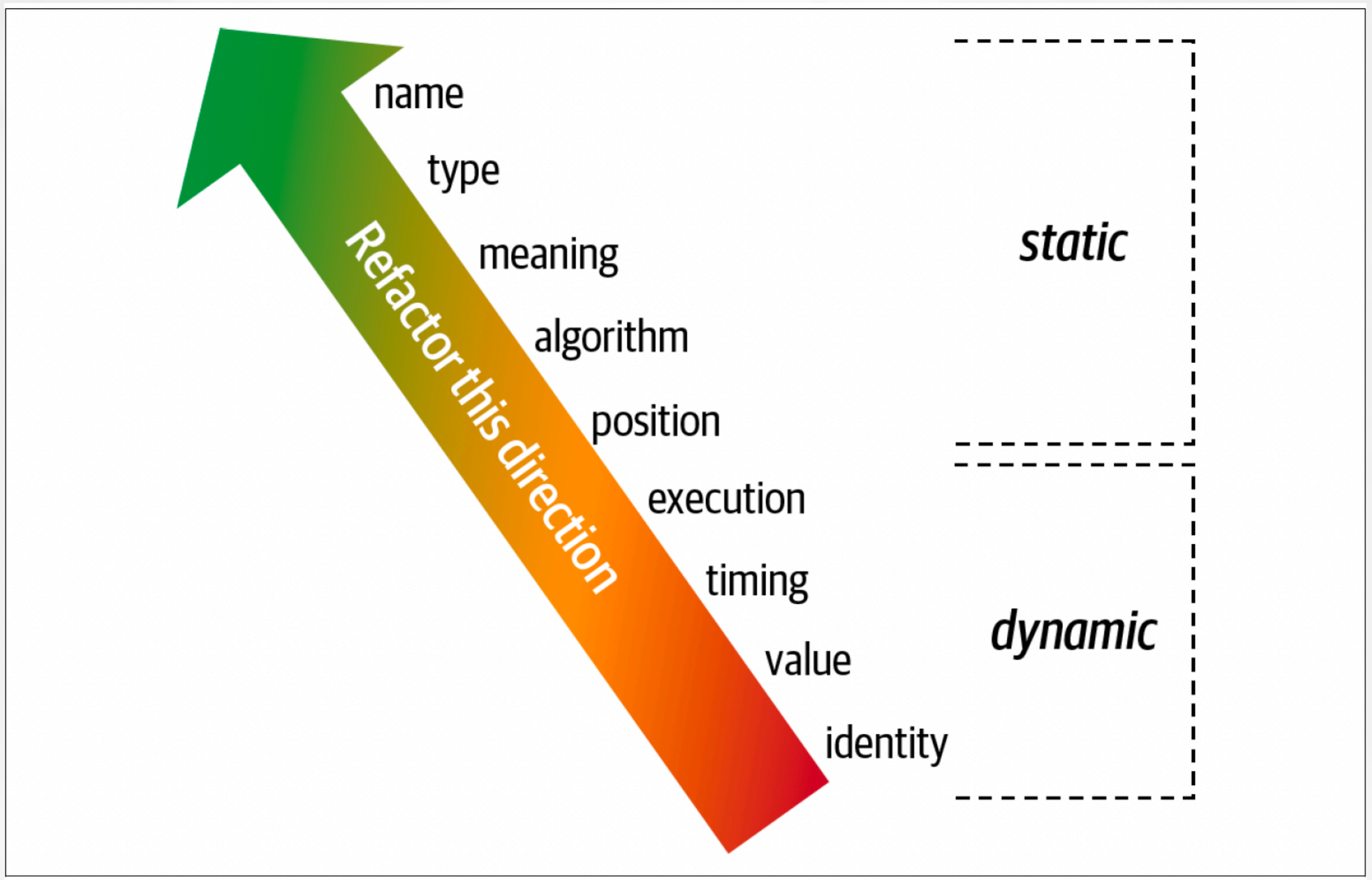
> Two components are connascent if a change in one would require the other to be modified in order to maintain the overall correctness of the system.
>
> —Meilir Page-Jones

STATIC CONNASCENCE

- Connascence of name
- Connascence of type
- Connascence of meaning
- Connascence of position
- Connascence of algorithm

DYNAMIC CONNASCENCE

- Connascence of Execution
- Connascence of Timing
- Connascence of Values
- Connascence of Identity


name
type
meaning
algorithm
position
execution
timing
value
identity
Refactor this direction
static
dynamic

Rule of Degree: Convert strong forms of connascence into weaker forms of connascence

Rule of Locality: As the distance between software elements increases, use weaker forms of connascence

The End