GLOSSARY OF SYMBOLS

The book spans a number of disciplines: physics, information theory, psychophysics ... By and large, the set of symbols characteristically used in a given discipline have been retained, which has led to some replication of nomenclature. For example, N_i has been used to represent the number of phase points in the i^{th} cell in phase space (as is common in physics), while N_o has been used for Avogadro's number (also common in chemistry and physics), $N(x;\mu,\sigma)$ represents the normal distribution with mean and variance, μ and σ, respectively (as is usual in statistics), and N is also used (psychophysically) to represent the total number of jnd's between two intensity levels. The use of a particular symbol will usually be readily apparent from its context, so the replication should not cause any problem.

The listing of symbols below is fairly complete. The number in parentheses which appears after the definition of a symbol refers to a representative equation in which the symbol appears.

Greek

α	proportionality constant (9.3)
β	Lagrangian multiplier (6.29)
γ	constant = β/t'(10.2)
δ	as in δx, used to indicate a small change in the quantity x
	δv_μ small cell in μ-space. Also used to indicate *the variation in*
ϵ	constant (10.13)
λ	mean of a Poisson distribution (7.2)
	constant = $\beta(I')^n$ (11.2)
μ	mean of a probability distribution
	μ-space ("μ" for "molecule"): a multidimensional space used in statistical mechanics
ν	frequency (sometimes represented as f)
σ^2	variance of a distribution:
	σ_S^2 variance of pure signal
	σ_N^2 variance of noise signal
	σ_R^2 variance of reference signal
τ	time: dummy variable (10.16)
ξ	time dilatation factor: introduced in Appendix 13.1
	multiply by ξ to convert time scale from behavioral to neuronal

Italics and Roman

a	represents a constant:
	proportionality constant in Fechner's law (3.4)/(10.5a), and in MacKay's (10.12)
	base of logarithm in Note 5, Chapter 2
	in Ferry-Porter law (3.30)
	ln A: Lagrangian multiplier (6.29)

b	represents a constant: Fechner's law (3.4)/(10.5a), MacKay (10.11), Ferry-Porter law (3.30)
C, c	c represents a constant: component of n (3.5) law by Ekman (3.10) C Piéron's law (3.26), specific heat per mole, channel capacity (8.21)
E, e	e base of natural logarithms $E()$ expectation (4.19)
F, f	f frequency (same as ν): MacKay (10.11), Riesz (14.9) to (14.11) density of points in μ-space (15.3) F perceptual variable: sometimes taken as subjective magnitude, sometimes as neural impulse rate [rate of generation of action potentials in afferent neurons]
ΔF	change in F: usually means change corresponding to one jnd
G	used to extremize the H-function (4.7)
H, h	h Planck's constant (14.19) H entropy
ΔH	change in H: threshold value of entropy (i) to permit discrimination (jnd) (ii) to permit detection or absolute threshold
$\mathscr{H}$	entropy relating to single outcome (4.14), (4.15)
$H(X)$	source entropy (4.19)
$H(Y)$	receiver entropy
$H(X, Y)$	joint entropy (4.22)
$H(X\|Y)$	conditional entropy (4.20)
H_I	information theoretical entropy: subscript "I" to eliminate ambiguity when the symbol is used within the context of a physical (statistical mechanics) system (6.19)
$\mathscr{I}$	information
$\mathscr{I}_m$	mutual information (4.16)
$\mathscr{I}(X\|Y)$, $\mathscr{I}(Y\|X)$	average mutual information (4.21)
I	intensity of a stimulus: *e.g.* concentration for a taste stimulus, square of mean sound pressure for an auditory stimulus
$I_\infty = I_{\text{min}}$	absolute threshold (3.23), (13.6), (13.36)
I_{thresh}	threshold intensity: a function of stimulus duration: for stimulus duration $\to \infty$, $I_{\text{thresh}} \to I_\infty$.
K, k	k scaling constant > 0 relating F to H in fundamental equation $F = kH$ integration constant (3.7) k_B Boltzmann's constant (6.20) K intercept of straight line (10.18) in law of olfactory threshold (13.55)
m	number of samplings made by a receptor of its stimulus population since the onset of the stimulus (9.2), (9.3)

N, n — n exponent of power law of sensation: introduced in (3.8), (10.8)
number of moles of a gas (1.1)
number of categories in an experiment on categorical judgment (Chapter 5)
number of discrete intensities (Chapter 9)
size of a sample as used in the Central Limit Theorem
total number of cells in μ-space (A15.1)

N total number of jnd's: $N_{I_a}^{I_b}$ is number of jnd's between intensities I_a and I_b.
sum of elements in a stimulus-response matrix
total number of phase points (6.25)
noise (8.21)

N_i number of phase points that lie in the i^{th} cell in μ-space

N_o Avogadro's number

$N(x; \mu, \sigma)$ the normal distribution: variable x, mean μ, and variance σ^2.

N_{jk} element in a stimulus-response matrix: number of times that stimulus j is given and identified as stimulus k

$N_{j\cdot}$ sum of elements in the j^{th} row of a stimulus-response matrix (4.24)

$N_{\cdot k}$ sum of elements in the k^{th} column of a stimulus-response matrix (4.23)

PBS — law Plateau-Brentano-Stevens law

PT — law Poulton-Teghtsoonian law (3.27), (12.31)

P, p — p probability: used in many ways

$p(x_j)$ probability of transmitting the symbol x_j

$p(y_k)$ probability of receiving the symbol y_k

$p(x_j, y_k)$ joint probability that x_j is transmitted and y_k is received

$p(x_j|y_k)$ conditional probability that signal x_j was transmitted given that y_k was received

$p(y_k|x_j)$ analogous to above

$p(\mathbf{x} = x_i)$ probability that a random variable, **x**, will take on the value x_i (7.1)

p_{ol} $-\log_{10} I_\infty = -\log_{10}$ (absolute threshold of a stimulus): used for olfactory stimuli

$P(x_j, y_k)$ probability of occurrence of x_j and y_k if x_j and y_k are independent events.

P pressure of a gas (Chapter 1)
signal power (8.21)

Q, q — quantity of heat

Range — ratio of highest physiological (non-painful) stimulus intensity to the absolute threshold stimulus intensity (3.27)

r — same as exponent, n (symbol of Riesz)

R — gas constant (Chapter 1)

R_0, R_i — membrane resistance (10.21)

S, s — physical entropy and physical entropy per mole, respectively (6.13)

S_0, S_∞ — values of the Weber fraction in Riesz's terminology (14.8)

T, t

t time: usually designates the time since stimulus onset: occasionally (when so-flagged) it designates the duration of the stimulus

t_s time between samples (9.2)

t_o time following the onset of the stimulus at which an adaptation curve reaches its maximum amplitude (11.5)

t_r simple reaction time (13.4), (13.7)

t_R candidate for simple reaction time (13.8)

$t_{r\,\min}$ minimum simple reaction time (13.5)

U, u internal energy and internal energy per mole, respectively

V volume of a gas (Chapter 1)

v_x, v_y, v_z cartesian velocity coordinates

WF law Weber-Fechner law

W thermodynamic probability: number of microstates corresponding to a given macrostate frequency bandwidth (8.20)

$\mathscr{W}$ work done by a system

w_i energy level of the i^{th} phase cell

x, y, z cartesian spatial coordinates

x_j transmitted symbol

y_k received symbol

Z, z

z number of photons (7.2)

Z partition function (6.30)