Glossary of Important Symbols

(Page numbers indicate first important or defining occurrences in the text.)

English Symbols

A	a particular structure attainable by an adaptive plan; $A \in \mathfrak{A}$ (5, 22)
$\mathfrak{A}$	domain of action of an adaptive plan, the structures it can attain (5, 21)
$\mathfrak{A}(t)$	the particular structure from $\mathfrak{A}$ being tried at time t (15, 22)
$\mathfrak{A}_1(t)$	that part of the structure $\mathfrak{A}(t)$ directly tested against the environment (23)
$\mathfrak{B}(t)$	the population (set of structures) acted upon by the reproductive plan at time t (88, 91)
$\langle c_i \rangle$	controlling sequence for mutation rate (122)
(C,J,V)	("initiation condition," "end signal," "predicted value") for behavioral atom (156)
d_i	dominance map for ith position of homologous pair of l-tuples (112)
E	a particular environment of a system undergoing adaptation (4, 25)
$\mathfrak{E}$	possible environments (uncertainty) of adaptive system (4, 25)
I	the range of signals the adaptive system can receive from the environment (22)
$I(t)$	the particular signal received by the adaptive system from the environment at time t (22)
$\mathfrak{I}_M$	first M positive integers (91)
k or k_i	number of attributes (alleles, etc.) associated with the (ith) detector (gene, etc.) (21, 72)
l	number of detectors (genes, etc.) used in the representation of structures in $\mathfrak{A}$ (66)

$l(\xi)$	length of schema ξ (102)
$l^p(\xi)$	number of positions on which schema ξ is defined (110)
$L(N)$	expected loss under an allocation of N trials (by plan τ) (77)
M	size of population (data base) $\mathfrak{B}(t)$ acted upon by reproductive plan (73, 91)
$\mathfrak{M}(t)$	memory, that part of the input history retained by the adaptive plan *in addition* to the part summarized in the tested structure $\mathfrak{A}_1(t)$, where $\mathfrak{A}(t) = (\mathfrak{A}_1(t), \mathfrak{M}(t))$ (23)
$M_\xi(t)$	number of instances of schema ξ in the population $\mathfrak{B}(t)$ (87, 98)
n	number of trials allocated to random variables other than the best in a set of random variables (77)
N	total number of trials allocated to a set of random variables (76)
$P(\xi,t)$	$=^{df.} M_\xi(t)/M$, the proportion of ξ in $\mathfrak{B}(t)$ (102, 127)
$P_{[\ ]}$	probability of operator [ ] being applied to an individual in $\mathfrak{B}(t)$ (102 P_C (crossing-over), 108 P_I (inversion), 110 ${}^1P_M$ (mutation))
$\mathcal{P}$	a *set* of probability distributions over $\mathfrak{A}$ (24)
Q_ξ	limit on rate of reproduction in environmental niche associated with ξ, set by renewal rates of resources in that niche (166)
r'	number of schemata receiving n' or more trials (under a genetic plan) (129)
$\mathfrak{R}_{[\ ]}$	reproductive plans of type [ ] (90 ff)
$\mathfrak{R}_1(P_C,P_I,{}^1P_M,\langle c_i\rangle)$	special class of type $\mathfrak{R}_1$ plans used in the study of robustness (121 ff)
t	time (20)
$\mathfrak{Z}$	a set of adaptive plans to be compared (25)
$U_{\tau,E}(T)$	the payoff accumulated by plan τ in environment E up to time T (26)
$\mathfrak{U}$	a set of random variables used when payoff is to be assigned stochastically to elements of $\mathfrak{A}$ (25)
V_i	set of attributes (range of values) for the ith detector, δ_i (66)

Greek Symbols

$\alpha(\xi,\Delta t)$	average excess (in genetics) of schema (coadapted set) ξ (137)
$\delta_i: \mathfrak{A} \to V_i$	detector, assigns attributes (values from V_i) to structures $A \in \mathfrak{A}$ (66; cf. 6, 44)

Δ	crossing-over "pressure" (101)
ϵ_ξ	fraction of instances of ξ in $\mathcal{B}(t)$ lost because of action of operators (125)
$\lambda(\xi)$	steady-state probability of occurrence of schema ξ under crossing-over (100)
Λ	$=^{\text{df.}} \{0,1,*,:,\diamond,\blacktriangledown,\triangledown,\Delta,p,'\}$, symbols of the broadcast language (144)
$\mu_E: \mathcal{A} \rightarrow \textit{Reals}$	payoff or performance of structure $A \in \mathcal{A}$ in environment E (4, 25)
μ_ξ	the expected payoff to schema ξ (under some given probability distribution P over $\mathcal{A}$) (69)
$\hat{\mu}_\xi$	the *observed* average performance (payoff) of a set of samples of ξ (69)
$\hat{\mu}(t)$	the observed average performance of the structures in $\mathcal{B}(t)$ (102)
$\mu(T)$ or $\mu(t)$	the average performance (payoff) of all trials of $\mathcal{A}$ to time T, or the average performance of trials of $\mathcal{A}$ at time-step t (69)
$\mu_{\lambda t}$	$=^{\text{df.}} \mu_E(A_\lambda(t))$ (94)
$\bar{\mu}_t$	$=^{\text{df.}} \sum_\lambda \mu_{\lambda t}/M$, average performance of population $\mathcal{B}(t)$ (94)
ξ	a schema (designating a subset of $\mathcal{A}$); $\xi \in \Xi$ (68)
$\xi_{(j)}(N)$	schema with the jth highest *observed* average after N trials (77)
Ξ	the set of schemata defined over $\mathcal{A}$ (68)
$\rho: \mathcal{A}_1 \rightarrow \Omega$	assigns operator to structure for plans of type $\mathcal{R}_{[\ ]}$ (92)
$\tau: I \times \mathcal{A} \rightarrow \Omega$ or $\tau: I \times \mathcal{A} \rightarrow \mathcal{A}$	an adaptive plan (4, 21)
χ	a criterion for comparing plans in the set $\mathfrak{I}$ (26)
$\omega: \mathcal{A} \rightarrow \mathcal{A}$ or $\omega: \mathcal{A} \rightarrow \mathcal{P}$	an operator (for modifying structures), either deterministic or stochastic; $\omega \in \Omega$ (24)
$\omega: \mathcal{J}_M \times \mathcal{A}_1^M \rightarrow \mathcal{P}$	a particular operator (for plans of type $\mathcal{R}_{[\ ]}$) (92)
Ω	the set of operators (for modifying structures) employed by an adaptive plan (3, 24)

Miscellaneous Symbols

$\square$	a "don't care" indicator used in the definition of schemata (68)
$[\ ]^\dagger$	set of all permutations of (elements of) $[\ ]$ (107)

$\sim$	ratio is 1 in the limit (78)
$\cong$	difference is negligible (under stated conditions) (78)
$=^{\text{df.}}$	defined to be equal (94)