values in all phases of the experiment.

During intertrial intervals, the disk was dark and the loudspeaker emitted noise. As a trial began, one of the seven tones replaced the noise, and one of the seven lights illuminated the disk. If the bird did not peck the disk, these stimuli went off after 1.2 seconds. If the bird pecked, the stimuli went off for the remainder of the 1.2-second period and noise resumed. After an intertrial interval of from 1 to 1.5 seconds, randomly chosen, a new stimulus combination appeared. After reinforced trials, the intertrial interval was extended to 3.5 seconds; it was also extended 0.6 second beyond any peck that occurred when the disk was dark. A LINC computer controlled the experiment and recorded the pigeons' responses.

The experiment passed through seven phases. The birds were run for (i) 30 days on the base-line auditory-visual discrimination, (ii) 7 days with the visual stimulus constant at its reinforced value, 582 nm, (iii) 4 days on the base-line conditions, (iv) 11 days with the auditory stimulus constant at its reinforced value, 3990 hz, (v) 13 days on the base-line conditions, (vi) 8 days without any sessions, the birds being fed enough in their home cages to keep their weight constant, and (vii) 4 days on the base-line conditions. The birds' responses on all reinforced trials and also their responses on the first series (49 test trials) from each session were excluded from the data reported below.

Figure 1 shows data collected from one bird just before each stimulus was held constant, during the constant conditions, and just after each return to two-dimensional testing. The other two birds produced similar data, though one bird had a consistently poorer discrimination on both stimulus dimensions. Panels A and D show the base-line two-dimensional discrimination performance. It is clear that on almost all trials the bird must have "attended to" both the visual and the auditory stimuli. This can be seen by considering responses at the two margins of the stimulus matrix along which one stimulus varies while the other is at its reinforced value; these are plotted on the "walls" of the three-dimensional graphs in Fig. 1. On each of these margins in panels A and D, the response percentage goes from about 95 to 10 percent, or less. Since each dimension alone controlled almost the maximal response change, we conclude that (by definition) each dimension was "attended to." ("Perfect attention" would be assured if a stimulus dimension controlled responding over the range of 0 to 100 percent. This observation is a sufficient though not a necessary condition for "attention.")

Figure 1B shows the last 2 days during which the visual stimulus remained constant at its reinforced value. When this curve is compared with the corresponding margin in panel A, it is seen that control by the auditory stimulus has sharpened considerably. On the first day of return to two-dimensional testing, the sharpened auditory control was largely maintained, while visual control suffered severely (Fig. 1C). After 4 days on the two-dimensional procedure, however, the initial base-line performance was almost regained (Fig. 1D). Somewhat better visual control was attained during the auditory-constant procedure; the last 2 days of this appear in panel E. The first day of return to two-dimensional testing after the auditory-constant procedure (Fig. 1F) shows an almost complete loss of control by the changes in the auditory stimulus. This control was only slowly regained; after 13 days it was still somewhat worse than in the earlier base-line sessions. Figure 1 does not show the results of the 8-day rest period. After this break in experimentation, both visual and auditory control were somewhat poorer than the previous base-line performance, but the effects on each were much less than the effects of constant stimulus training. As with the other effects reported here, the magnitude of these changes might have been affected by the order in which the procedures were run, but the birds had such prolonged and varied experience with the stimuli that this seems unlikely.

One account of the results might run as follows. In the base-line condition, slight differences among visual and auditory stimuli control the bird's response and both these classes of stimuli occasion intense analytic activity ("attention"). When only one visual or auditory stimulus appears, and hence this stimulus class is uncorrelated with reinforcement, analysis of these stimuli diminishes. Analysis only gradually resumes when both classes of stimuli are again correlated with reinforcement. This is not the only possible account of these results, and, even if they retained the basic idea, various theorists might alter or reword it in various ways (*3*) that cannot be detailed here. However, a few points of theoretical relevance may be suggested. First, it would be difficult to interpret the effect of constant training as the extinction of an overt observing response. The tone stimulus "filled" the chamber, while the visual stimulus was always on the key when the pigeon pecked. Observations of the birds revealed no significant changes in gross behavior during the experiments. Second, there is some suggestion here of a trading relation between visual and auditory control. Most noticeably, auditory control got better after visual constant training, and worse again on return to two-dimensional training (right margin, Fig. 1, A–D). Third, the results appear to separate the "salience" of the two sets of stimuli from their "discriminability." Auditory control was not as complete as visual in the two-dimensional tests (Fig. 1, A and D); it was lost more completely (Fig. 1F) and regained much more slowly than visual control. Yet, under the present conditions these auditory stimuli were differentiated more accurately than were the visual stimuli (Fig. 1, B and E).

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Protein Subunits: A Table (Second Edition)

A table containing a list of proteins in which subunits are held together by noncovalent bonds was published in *Science* 2½ years ago (*1*). The wide response from readers indicates that this table was useful for research and teaching purposes. It seems appropriate, therefore, to prepare a revised edition which includes new listings as well as changes that are required to bring the earlier entries up to date.

Decisions with regard to the entries in Table 1, as well as choices of references, have been based on the same criteria described previously (*1*).

Table 1. Subunit constitution of proteins.

Protein	Molecular weight	Subunits No.	Subunits Molecular weight
Insulin (*2*)	11,466	2	5,733
Thrombin (*3*)	31,000	(3)	(10,000)
β-Lactoglobulin (*4*)	35,000	2	17,500
Rhodanese (*5*)	37,000	2	18,500
Bovine growth hormone (*6*)	48,000	2	25,000
Neurospora malate dehydrogenase (*7*)	54,000	4	13,500
Hemoglobin (*8*)	64,500	4	16,000
Thiogalactoside transacetylase (*9*)	65,300	2	29,700
Rat liver malate dehydrogenase (*10*)	66,300	2	37,500
O-Acetylserine sulfhydrylase A (*11*)	68,000	2	34,000
Tropomyosin B (*12*)	68,000	2	33,500
Avidin (*13*)	68,300	4	18,000
Concanavalin A (*14*)	71,000	4	17,500
Glycerol-1-phosphate dehydrogenase (*15*)	78,000	2	40,000
Uridine diphosphogalactose-4-epimerase (*16*)	79,000	2	39,000
Alkaline phosphatase (*17*)	80,000	2	40,000
Creatine kinase (*18*)	80,000	2	40,000
Liver alcohol dehydrogenase (*19*)	80,000	4	20,000
Yeast aldolase (*20*)	80,000	2	40,000
Enolase (*21*)	82,000	2	41,000
Haptoglobin 1–1 (*22*)	85,000	2	40,000
Procarboxypeptidase (*23*)	87,000	1	34,500
		2	25,000
Firefly luciferase (*24*)	92,000	2	52,000
Methionine-transfer RNA synthetase (*25*)	96,000	2	48,000
α-Amylase (*26*)	97,600	2	48,200
Aspartate aminotransferase (*27*)	100,000	2	50,000
Hexokinase (*28*)	102,000	4	27,500
Hemerythrin (*29*)	108,000	8	13,500
Spinach leaf aldolase (*30*)	120,000	4	30,000
Tyrosinase (*31*)	128,000	4	32,000
C-Reactive protein (*32*)	129,000	6	21,500
Fructose diphosphatase (*33*)	130,000	2	29,000
		2	37,000
Mammary glucose-6-phosphate dehydrogenase (*34*)	130,000	2	63,000
Ornithine amino transferase (*35*)	132,000	4	33,000
L-Amino acid oxidase (*36*)	135,000	2	70,000
Glyceraldehyde-3-phosphate dehydrogenase (*37*)	140,000	2	72,000
	72,000	2	37,000
Mouse nerve growth factor protein (*38*)	140,000	4–6	30,000
Tartaric acid dehydrase (*39*)	145,000	4	39,000
Lactic dehydrogenase (*40*)	150,000	4	35,000
	35,000	2	18,000
Pyridoxamine pyruvate transaminase (*41*)	150,000	4	38,000
Yeast alcohol dehydrogenase (*42*)	150,000	4	37,000
Ceruloplasmin (*43*)	151,000	8	18,000
Tryptophan synthetase (*44*)	159,000	2	49,500
		2	29,500
Muscle aldolase (*45*)	160,000	4	40,000
Cystathionine γ-synthetase (*46*)	160,000	4	40,000
Threonine deaminase (*47*)	160,000	4	40,000
Carboxylesterase (*48*)	167,000	2	85,500
Thetin homocysteine methylpherase (*49*)	180,000	3–4	50,000
Histidine decarboxylase (*50*)	190,000	10	19,000
Fumarase (*51*)	194,000	4	48,500
Salmonella threonine deaminase (*52*)	194,000	4	48,500
Phosphoenolpyruvate carboxylase (*53*)	198,000	4	49,200
Plasma high-density lipoprotein (*54*)	210,000	4	28,000
Phosphoribosyl adenosine triphosphate: pyrophosphate phosphoribosyl transferase (*55*)	215,000	6	36,000
Tryptophanase (*56*)	220,000	2	110,000
	110,000	2	55,000
Paramyosin (*57*)	220,000	2	110,000
Formyltetrahydrofolate synthetase (*58*)	230,000	4	58,000
Catalase (*59*)	232,000	4	57,500
Pyruvate kinase (*60*)	237,000	4	57,200
Anthranilate synthetase complex (*61*)	240,000	6	40,000
Glucose-6-phosphate dehydrogenase (*62*)	240,000	6	43,000
Phytochrome (*63*)	252,000	6	42,000
Phycocyanin (*64*)	266,000	2	134,000
	134,000	4	28,000
Glycollate oxidase (*65*)	270,000	2	140,000
Mitochondrial adenosine triphosphatase (*66*)	284,000	10	26,000
Cysteine synthetase (*67*)	309,000	1	160,000
		2	68,000
Aspartyl transcarbamylase (*68*)	310,000	2	100,000
		2	50,000
	100,000	3	33,000
	50,000	3	17,000
Acetoacetate decarboxylase (*69*)	340,000	6	62,000
	62,000	2	29,000
Arachin (*70*)	345,000	2	180,000
	180,000	6	30,000
Phosphorylase A (*71*)	370,000	4	92,500
Lipovitellin (*72*)	400,000	2	200,000
Phosphoenolpyruvate carboxytransphosphorylase (*73*)	430,000	(3–4)	(120,000)
Fatty acid synthetase (*74*)	450,000	2	230,000
Apoferritin (*75*)	480,000	20	24,000
Urease (*76*)	483,000	6	83,000
Fraction 1 protein, carboxydismutase (*77*)	515,000	24	22,000
Myosin (*78*)	468,000	2	212,000
		2–3	20,000
β-Galactosidase (*79*)	520,000	4	130,000
	130,000	3–4	(40,000)
Glutamine synthetase (*80*)	592,000	12	48,500
Pyruvate carboxylase (*81*)	660,000	4	165,000
	165,000	4	45,000
Thyroglobulin (*82*)	669,000	2	335,000
Propionyl carboxylase (*83*)	700,000	4	175,000
α-Crystallin (*84*)	810,000	(30)	26,000
Arginine decarboxylase (*85*)	850,000	5	165,000
	165,000	2	85,000
RNA polymerase (*86*)	880,000	2	440,000
Lipoic reductase-transacetylase (*78*)	1,600,000	60	27,000
Glutamic dehydrogenase (*88*)	2,000,000	8	250,000
	250,000	5	50,000
Hemocyanin (*89*)	300,000–		385,000
	9,000,000		70,000
			35,000
Chlorocruorin (*90*)	2,750,000	12	250,000
Bromegrass mosaic virus (*91*)	4,600,000	180	20,000
Turnip-yellow mosaic virus (*92*)	5,000,000	150	21,000
Poliomyelitis virus (*93*)	5,500,000	130	27,000
Cucumber mosaic virus (*94*)	6,000,000	185	21,500
Alfalfa mosaic virus (*95*)	7,400,000	160	35,000
Liver acetyl coenzyme A carboxylase (*96*)	8,300,000	2	4,100,000
	4,100,000	10	409,000
Bushy stunt virus (*97*)	9,000,000	120	60,000
Potato virus X (*98*)	35,000,000	650	52,000
Tobacco mosaic virus (*99*)	40,000,000	2130	17,500

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