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1	PAGE NO.	DEACON, T. INCOMPLETE NATURE	JUARRERO, A. DYNAMICS IN ACTION		
2	6	Maturana and Varela autopoiesis	p112		
3	7	Inside and outside perspectives	p51		
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5	18	Child's muscle movements	p 158-9-- citing work of Thelen & Smith		
6	19ff	Reduction of teleology and purpose	Chapter 5 -- on the reduction of purposiveness and teleology		
7	29	Multiple realizability introduced for the first time	p 52, p. 189		
8	29	type/token distinction	pp 109-110		
9	29	function as multiply realizable	p123-5		
10	34	Aristotle's four causes for the first time -- special emphasis on formal & final	p2 (for the first time here too)		
11	36	Integration of parts of a machine	p112 -- allopoiesis		
12	39	Descartes	p23 Descartes		
13	41	Anticipatory processes introduced --	p63 - anticipatory		
14	41	Organization as explanation of absential property -- telic	p45-6 -- organization and teleology/purposiveness Kant		
15	44	Introduces understanding causality in terms of causality of dynamics	Most of chapter 10 is about that		
16	45	"abandoning billiard-ball causality" in favor of waves of probability			
17	48ff	behaviorist reduction of purposiveness	p 50 and p 63ff (Chapter 5)		
18	51	preformationism	p106 bottom		
19	55	elan vital	p131		
20	58	Reversal of explanatory direction	p. 224 -- attributed to william Wimsatt		
21		"billiard ball causality"	p 131 -- "billiard ball like"		
22	59	"Concept of efficient cause has become the paradigm exemplar for all fully described conceptions of cause in the natural sciences" -- see pp2-3 in JUARRERO			
23	59	Personal experience of causal agency as archetype of final causality	pp 25-27 -- agent causation		
24	61	"God of the gaps"	"God of the gaps" used on p258		
25	62	Intentional properties reduced without remainder			
26	62	soporific factor			
27	65	potter's wheel as example of formal/final cause	Used as example of formal/final cause in Cancun talk		
28	68-9	geometry of embryological development -- term "blastula" used	p 156 on geometry of embryological development -- term blastula used		
29	69	epigenesis introduced for first time			
30		constraints and biases.	Subject of Chapter 9		
31	75	relationship between entropy and information	p 98-99		
32	77-78	zombies	fn #53 appears on p172		
33	76	Shannon information is not about anything	98-99 -- NOTE LAST TWO QUOTES TRACK SEQUENCE OF REFERENCE IN DIA		
34	81	eliminative materialism	p 170		
35	84	folk psychology	p 170 -- NOTE LAST TWO QUOTES IN IN TRACK SEQUENCE OF REFERENCES IN DIA		
36	85	decomposability	p113		
37	87	zombies	fn 53		
38	89-91	deductive form of explanation assumed for natural sciences	p8-9 and chapter 14		
39	92	problem with assuming syntax and semantics are independent of one another	pp 164-170 syntax embodies semantics		
40	92	relational constraints	p133 -- major theme of Chapter 9		
41	98-99	multiple realizability	pp 122-125		
42	108	living things violate classical thermodynamics (apparently)	p 4		
43	109	Organized to achieve a specific end = final cause (Aristotle) + ffe thermodynamics	Main thesis of DIA		
44	117	Bateson's difference that makes a difference	p 134		
45	118	thermostat example	p 112 thermostat example		
46	120-121	"fall of an object in a gravitational field"	64 avalanche example		
47	121	time reversibility of Newtonian mechanics	p 22		
48	127	Gerald Edelman quoted	p 7, 143, 188		
49	131	role of probability (in DNA) introduced	Chapter 9 -- not related to DNA but to constraints as frequency & probability distributions		
50	140	teleology raises troublesome questions about the very nature of physical causality	Main Thesis of DIA		
51	141	causal power... vested in work that is a functional of relational features	p133 and 143-44		
52	145	emergence as hierarchical	p140		
53	147	EMERGENTISTS -- Lewes	in Juarrero & Rubino		
54	148	Lewes quote	in Juarrero & Rubino		
55	148	Mill quote	in Juarrero & Rubino		
56	150-151	Darwin and emergence of brand new forms	p 105 bottom		
57	151	mental processes defined in teleological terms	p 84 -- attributed to John Searle		

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58	152	reductionism and atomism	pp 21-22		
59	153	"smallism" dismisses complexity	pp 20-23		
60	156	Emergentist Lloyd Morgan	in Juarrero & Rubino		
61	157	"the question at issue was whether some new kind of causality"	p 47 "nothing analogous to any causality known to us" Kant		
62	157-59	Samuel Alexander & CD Broad	in Juarrero & Rubino		
63	160	UNUSUAL IDENTIFICATION OF VON BERTALANFFY AS AN EMERGENTIST	in Juarrero & Rubino		
64	161	Top-down as change in probabilities "might more accurately be described in terms of constraint" -- MAIN THESIS OF DIA CHAPTER			
65	161	"this downward sort of causality.... A species of formal cause"	p125-126; p. 246		
66	162	downward causation in this sense is not [efficient cause] but alteration of causal probabilities == MAIN THESIS OF DIA CHAPTER			
67	162-3	components of dynamical structures not fused	p 114 -- also discussed in CANCUN		
68	163	range of possible actions is ... vastly constrained	"p144 --"reduce the number of ways in which the parts can be arranged" -- 142ff in general		
69	166	mereology	term used in Cancun		
70	171	first entry for Stuart Kauffman	mentioned throughout DIA		
71	169	"new kinds of components also came into existence"	pp128-129 -- "a new type of entity... appears"		
72	171	phase space	p152		
73	172	image of a lorez butterfly	p155 image of a Lorenz butterfly		
74	173	"attractor structure can be loosely compared to end-directeness"	179 attractors (and neural attractors in particular) as embodying purposiveness -- and chapter 13		
75	175	processes	p 112 thermostat example		
76	178		p124 -- danger of reifying processes		
77	178	Hofstadter's strange loops	p 129 -- Hofstadter's strange loops		
78	180	boundary conditions	role of emphasized in Cancun talks		
79	183	CHAPTER TITLE: CONSTRAINTS	p. 131--CHAPTER TITLE CONSTRAINTS AS CAUSES		
80	183	Habit in Peirce	In Juarrero & Rubino		
81	184	Redundancy is a defining attribute of dynamic organization	p134ff (Gatlin's term is context-sensitive redundancy"		
82	185	whirlpool example	145 -- DiA refers to these as "eddies of order"		
83	190	"if not all possible states are realized"	many quotes from Brooks & Wiley		
84	192	"what could have been"	p. 133 "what you could say"		
85	193	possible features not expressed	quotes from Brooks & Wiley in DIA		
86	194	individuation	p246 -- increasingly constrained phase space as mark of individuation		
87	195	constraint as the elimination of ... features that could have been present	Chapter 13 -- and p136		
88	196	system's capacity to do work determined by constraint	p 144-145		
89	200	"constrained to an attractor with a very high probability"	p152-155; 192-93; 195		
90	202	"a constraint is relational".	p133 -- "Constraints are therefore relational properties"		
91	208-209	thermodynamic change not "pushed" (efficient cause)	p130		
92	209	requiring "something else from outside to perturb things"	pp18-19		
93	210	since the Enlightenment only one form of causality	p21 -- NOTE LAST TWO QUOTES TRACK SEQUENCE IN DIA		
94	213	when changing nonspontaneously they must be caused to do so extrinsically	18-19		
95	214	compressed spring	p 135 -- gas piston		
96	220	time reversibility of newtonian laws of motion	pp 104-105		
97	221	efficient cause as limiting case			
98	222	shhouldn't abuse the meaning of "cause to happen"	p107 --		
99	226	constrained in state space	Brooks & Wiley		
100	227	contragrade is not additive	p. 1234 "not an additive measure"		
101	226	reversal of orthograde processes	Ulanowicz's muscatine grape		
102	227	Ilya Prigogine	p119 ff		
103	228	"what I will call emergent dynamics"	Main thesis of DIA		
104	229	to consider the concept of order with respect to constraint	p131 and rest of Chapter 9		
105	230	attractor	description of attractors -- pp 152-155		
106	230	warped phase space -- geometry ... is a relational property	p. 160 catastrophic bifurcations		
107	231	bottom paragraph	p138-9		
108	231	bottom-up causal logic... top-down causal logic	pp 142-45		
109	232	downward causation interpreted as a case of formal causation	p125-126. Attributed in various places to Ulanowicz		
110	233	resonance and oscillators	p115-116 oscillators and entrainment		
111	235	second aw... allows--even promotes-- spontaneous increase in order and complex partitioning -- DIA p. 123			
112	237	morphodynamics = physical self organization of benard cells, whirlpools			
113	243	B-Z reaction	p121-22 --		
114	244	disapproval of term "top-down causality" -- misinterprets self-organization as directed by a self			

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115	245	far from equilibrium thermodynamics	119 CHAPTER CALLED NONEQUILIBRIUM THERMODYNAMICS		
116	246	gradients	p120 NOTE TRACKING DIA SEQUENCE		
117	247	bifurcation points	p120 NOTE TRACKING DIA SEQUENCE		
118	248	Convection benard cells	119-120		
119	249	stable global level constraints	p 139, 141		
120	250	"second order intrinsic constraints"	p141ff "second-order constraints"		
121	254-55		140-144 in general		
122	259	snowflakes	140 snowflakes --		
123	259	lasers	144 Haken on lasers		
124	261	last paragraph	main thesis of DIA		
125	268	Swenson on maximum entropy production	footnote 49 -- appears on p. 145		
126	270	italicized sentence	p125 -- all page		
127	273	"for the sake of preserving the integrity and persistence..."	"acting to preserve and enhance the integrity of the higher level"		
128	273	precursors... of ... self, intention, significance, purpose...	127 "precursor of teleology" -- NOTE HOW THESE QUOTES ALL TRACK PAGES IN DIA		
129	274	Maturana and Varela -- autopoiesis	p109		
130	275	teleodynamics is dynamical realization of final causality	p127ff		
131	288	AUTOGENESIS	p121 -- term used in fn 40 and attributed to Kampis		
132	288	quote from Kant	pp45-47		
133	292	autocatalysis	Juarrero-Roque 1985 paper is on Kant & Autocatalysis -- in DIA p121		
134	294	autocatalysis speeds up	121 autocatalysis as runaway process		
135	294	members of autocatalytic constellation increase in proportion	p125 and attributed to Ulanowicz		
136	295	linked catalytic reactions are mutually reinforcing	term "mutualist" used throughout p. 121 and attributed to Ulanowicz		
137	294	Eigen's hypercycles	295 hypercycles		
138	296	boundary conditions	boundary conditions emphasized in Cancun talk -- not so much in DiA		
139	297	self-assembly	p178 "self-assembly" attributed to Swenson		
140	299	context-derived	term "context dependent" used throughout DiA		
141	302	Kant on motive and formative power	p47		
142	304	self assembly and autocatalysis	121		
143	305	proximity of molecules potentiates catalysis			
144	308	autocatalytic cycles and autogenic systems	121, 125		
145	309, 311	dynamics... constitutes a form of individuality, or "self"	Ulanowicz first to label dynamics an example of emergence of "proto-self"		
146	310	self-reconstitution and dynamical organization/continuity of constraints	124-125		
147	311	continuity of constraint constitutes individuality	123-24 identity given by constraints -- and information		
148			component producing products and their resulting components p. 125		
149	310	first mention of umwelt	term "world" used		
150	311	"context-dependence" used	term used throughout DiA		
151	314	intrinsic dynamic "topology"	dynamics described in terms of topology in chapter 10, which uses term in its heading		
152	315	"autonomous agents" and Kauffman	autonomy p 146 and "point of view" p. 126		
153	316	ratchet effect	verb "ratchet" used on p. 4		
154	316	attractor basins... "not additive"	p123 "not an additive measure"		
155		DISTINCTION BETWEEN MORPHODYNAMICS And TELEODYNAMICS	Made in Cancun as difference between physical, chemical and biological dynamics		
156	321	Kant quotes on components present for the sake of others	p121-23		
157	320	language evolution			
158	320	"robustness to perturbation"	p. 250 "robustness to perturbations" -- plus whole section on robustness and akrasia		
159	322	basic form of value has emerged	mentioned in Cancun as basis of molecule selection for autocatalysis -- basis for normativity specifically mentioned		
160	323	general comments about teleology emerging from consequence organized processes --- p125-30	make the same point		
161	324	role of topology	chapter 10 is about dynamic constraints as topological		
162	324	transition from one "regime" to another	p160 -- use of term "regime" in the same context		
163	324	role of constraint in transition from one regime to another	role of constraints here too on p. 160		
164	327	Galileo... neglecting the effects of friction	p 104 Galileo "dismisses friction"		
165	328	with each emergent transition novel capacity to do work emerges			
166			179 biases and probability		
167	332	mental agency and causality	main thesis of DIA		
168	338	property of whole is geometric... think of it as formal cause	geometry first mentioned on p 132; and on p 143 Ulanowicz credited with whole acting as formal cause		
169	340	piston example	pp135-6 piston example		
170	347	"enabling constraints"	140 142 -- enabling constraints		
171	352	resonance and oscillators	oscillators and entrainment p 115-116		

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172	354	coupled oscillators	p115 coupled oscillators		
173	357	pendulum example -- coupled one used	p153 --- I only mention single pendulum		
174	360	intentionally willed action	main thesis of DiA		
175	368	emergent causal powers of mental agency do not violate law of conservation	pp 144-146 on nature's own jekyll and hyde		
176	371	CHAPTER ENTITLED INFORMATION	p 77 CHAPTER ENTITLED INFORMATION THEORY AND THE PROBLEM OF ACTION		
177	376	sins of omission used to refer to non-action as still purposive	"acts of omission" to refer to non-action as still purposive p. 186		8
178	378	constraints and information	p97, 178-9		
179	378	section called Two Entropies	p 134		
180	379	example of distribution of objects in a room taken from Koenig and Kosslyn			
181	380	signal transmission corruption -- Shannon	pp78-79		
182	381	Shannon information is not about anything --	p99		
183	382-383	"hiss of radio signals"	"static hiss" p. 133		
184		Static hiss used to illustrate need for deviation from equiprobability	static hiss used to illustrate constraints -- footnote #26 appears on p81		
185	384	Examples from language to illustrate pattern, redundancy, constraint, channel capacity p137			
186	384	TYPO EXAMPLE	Typing example p 206		
187	386	possible letter combinations to illustrate information theory	p135-138		
188	386, 501	"resending a signal multiple times" to reduce Shannon entropy	p134-135		
189	387	signal constraint and information	p134ff		
190	388	"a constraint is... a relational property"	p133 "constraints are therefore relational properties"		
191	389	Maxwell's demon	144-145 Maxwell's demon exorcised with dynamics		
192	390	CHAPTER ENTITLED SIGNIFICANCE	CHAPTER ENTITLED EMBODIED MEANING		
193	393	"a difference that makes a difference"	p134		
194	393,398	interpretive process is normative	emphasized in Cancun -- term "hermeneutics" used here in chapter 14		
195	394	thermostat example	p137 footnote #37 is about thermostats		
196	395	"circularity of causal influences"			
197	398	thermostat example	p112 thermostat example		
198		TERMS ENTANGLEMENT, ENTANGLE, TANGLED used often	Terms used often to illustrate the same point		
199	399	arecursive dynamical organization generates attractor mediated behavior	178-79		
200	399	"information carrying/producing capacity"	p. 176 "information carrying capacity" of a species		
201	396	attractor-governed behavior	212, 220-221; attractor governed behavior		
202	403	Shannon information/redundancy	pp 136-37 -- Shannon information and redundancy		
203	404	English sentences and correcting typos	Proofreading		
204	406	example of a jury listening to evidence	p239 example of a jury listening to evidence		
205	410	sensitivity to initial conditions	p 222 -- sensitivity to initial conditions		
206	411	noise and equivocation	p79 ENTIRE SECTION CALLED NOISE AND EQUIVOCATION		
207	412	word substitution errors	79 word substitution to illustrate lack of information flow		
208	416	Habit in Peirce	In Juarrero & Rubino		
209	421	evolution literally means an unrolling process	105 bottom		
210	427	constrained development	most quotes from Brooks & Wiley in DiA address this point		
211	428	top -- ditto	pp176-7		
212	454,456	sequestered constraints	mentioned in Cancun and referenced Alvaro Moreno with that idea.		
213	452-53	proximity of molecules potentiates catalysis	I mention this somewhere but can't find it!		
214	457	dynamically embodied constraints are probabilistic"	p141 is all about precisely that point		
215	458	capacity to offload information	p202 about Merlin Donald's book		
216	462	increase in evolutionary channel capacity	pp142-145 are all about that	fn42	
217	465	circularity of teleodynamics --	maint point of autocatalysis and Kant article -- and section in DiA is to point this out		
218	468	Individuation	p 258ff & pp 123-4		
219	458	liar's paradox	Cretan liar paradox p. 20		
220	469	inextrigably tangled	tangled whole/part		
221	470-71	differentiation	p158ff		
222	479	Agency	Agency is main theme of DiA		
223	480	agency as locus of causal efficiency	Agency is main theme of DiA		
224	484	self as emergent from circular dynamic	use "agent" instead of "self"		
225	486	BACK PROPAGATION	p 164-65 BACK PROPAGATION		
226	487	reconceptualizing consciousness in dynamical terms	main thesis of DiA		
227	488	Syntax and semantics dissolve with dynamics	All references to Elman in DiA -- beginning p. 168		
228	489-4990	entional phenomena and properties emerge from dynamics	Main thesis of DiA		
229	492	Searle Chinese room on syntax and semantics	explicitly linked on p. 170		
230	497	machine constraints imposed extrinsically	section on Allopoiesis p112		

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231	502	neural processes as emergent dynamic processes	p178-79; 191 neural processes as emergent dynamic processes		
232	506	first and third person distinctions	p254 -- point of view		
233	506	Chinese room & dynamics	p170 Chinese room and dynamics		
234	510	hierarchy of causality	p127 entangled causality		
235	512	emotion	178-79 on Damasio on role of emotion		
236	512	emotion serves to minimize disequilibrium	p178-80 emotion dissipates gradient		
237	514	FREUD'S HYDRODYNAMIC METAPHOR	p136 -- Freud and hydraulics -- included in fn 44		
238	518, 521	inertia and mental content	section on Akrasia as related to system dynamics p 250-251		
239	520	dynamics of "alert state"	p255 dynamics of alertness		
240	522	dynamics and temporality	fn 65 talks about dynamic TEMPORAL constraints -- reference is on p. 203 of DiA		
241	525	ethics	pp247-49		
242	533	learning and biasing	pp164-5; 179		
243	534	breaking spell of dualism with causal fabric of dynamical constraints	main thesis of DIA		