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/*
 * THE GUIDE TO NONEXISTENT BIRDS - AN ORNITHOLOGICAL LOGIC
 * Edited by Kavi Duvvoori
 *
 *
 *
 * (How I would recommend reading this thing, though there is room for
 * debate on this question - read the Neruda poem, all the comments I
 * wrote (I'm attached to a few of them), the Wallace Stevens in its
 * entirety but only once, skip the Keats except for a few lines for
 * atmosphere, the Bukowski won't take up too much of your time (the
 * poems are included not because i think they're the very best bird
 * related poems there are but because maybe they somehow help develop
 * the narrative), skim 13 or so birds, and don't bother with the code
 * except for a few carefully named variables; it's up to you what to do
 * with the rest of it)
 *
 *-- Returning 5 years later: I was 19. It was my first try at digital
 *-- lit. Some I excuse as the work of "trying on thoughts," some I don't.
 *--
 *-- I believe I understood the faint irony of using these poets but
 *-- failed to work with their cliche. Only Stevens is faintly defensible.
 *-- But none of that matters, not in the scheme of things, we all know.
 *--
 *-- I wish I could not have included the following poem, because Pablo
 *-- Neruda was a rapist. He wrote it lyrically in his autobiography or he
 *-- might have died with his rape, but no one really noticed, for decades
 *-- it seems. You see, he wrote his rape (of a Sri Lankan woman, where he
 *-- was ambassador) in the way he wrote his poetry, unrepentant except to
 *-- turn the mood as a shift of register. She was in a position, by
 *-- language, class & caste, asymmetry of power, incapable, literally,
 *-- of speech as a subject. And then, towards the end of his life, he
 *-- wrote again his rape (after no one asked) in a way that acknowledges
 *-- irrelevant shame but reenacts his, her society's, literary criticism's
 *-- denial of her, who I do assume real, humanity. I heard about it in my
 *-- Spanish class and, weirdly for its commonality, couldn't read that
 *-- week (I admit this is a performative morality).
 *--
 *-- The poem came after the project. I was not intensely or particularly
 *-- a fan. But it was the schematic of my essay (this): it was talking
 *-- about the (literal) content I was talking about, in a totally
 *-- different rhetoric, well or badly effectively irrelevant. I will
 *-- write about sexual violence here not because I have yet done the work
 *-- to be a person to write about it; but I acknowledge I was writing it
 *-- already, so if I intend to keeping using this essay: more, using
 *-- this essay as the messy incipience of a certain intellectual project
 *-- (mine), a portfolio piece.
 *
 * BIRD
 * Pablo Neruda
 *
 * It was passed from one bird to another,
 * the whole gift of the day.
 * The day went from flute to flute,
 * went dressed in vegetation,
 * in flights which opened a tunnel
 * through which the wind would pass
 * to where birds were breaking open
 * the dense blue air -
 * and there, night came in.
```

```
 *
 * When I returned from so many journeys,
 * I stayed suspended and green
 * between sun and geography -
 * I saw how wings worked,
 * how perfumes are transmitted
 * by feathery telegraph,
 * and from above I saw the path,
 * the springs and the roof tiles,
 * the fishermen at their trades,
 * the trousers of the foam;
 * I saw it all from my green sky.
 * I had no more alphabet
 * than the swallows in their courses,
 * the tiny, shining water
 * of the small bird on fire
 * which dances out of the pollen
 *
 */

:- use_module(library(http/http_unix_daemon)).
:- use_module(library(http/thread_httpd)).
:- use_module(library(http/http_dispatch)).
:- use_module(library(http/http_error)).
:- use_module(library(http/html_write)).

:- initialization http_daemon.

% NOTE: We cannot yet guarantee that any birds described in this guide
% do not, in fact, exist. We deeply and sincerely apologize for any
% inconvenience this causes and, pending venture capitalist funding,
% are working on developing a solution to this problem.

fibonacci(0,0).
fibonacci(1,1).
fibonacci(N, FIB_N):-
  N >= 2,
  NMONE is N-1,
  NMTWO is N-2,
  fibonacci(NMONE,FIB_NMONE),
  fibonacci(NMTWO,FIB_NMTWO),
  FIB_N is FIB_NMONE + FIB_NMTWO.

strs_flatten(STR_LIST,FLAT_STR) :-
  maplist(string_chars, STR_LIST, CHAR_LISTS),
  flatten(CHAR_LISTS, FLAT_CHARS),
  string_chars(FLAT_STR,FLAT_CHARS).

capitalize_first("","").
capitalize_first(STR,STR_START_CAPITALIZED):-
  string_chars(STR,CHARS),
  CHARS = [H|R],
  upcase_atom(H,CH),
  NEW_CHARS = [CH|R],
  string_chars(STR_START_CAPITALIZED,NEW_CHARS).

server :-
    server(8080).
server(Port) :-
    http_server(http_dispatch, [port(Port)]).
```

```
121
122 :- http_handler('/ornitholoical', say_birds, []).
123 :- http_handler('/OrnithologicalLogic.pdf',
    http_reply_file('OrnithologicalLogic.pdf', []), []).
124
125 run :-
126     server,
127
128 /*
129  * THIRTEEN WAYS OF LOOKING AT A BLACKBIRD
130  * Wallace Stevens
131  *
132  * I
133  * Among twenty snowy mountains,
134  * The only moving thing
135  * Was the eye of the blackbird.
136  * ...
137  */
138
139 % We will start with a few of the names necessary for any bird watcher,
140 % or bird-imaginer
141
142
143 birdFamilies(["hummingbird","thrush","tinamou","egret","hawk","kestrel",
144         "eagle","duck","falcon","partridge","brush-turkey","grebe",
145         "coot","swallow","grouse","guineafowl","woodpecker",
146         "shellduck","barbet","vulture","gull","flycatcher","swift",
147         "albatross","oriole"]).
148
149 /*
150  * THIRTEEN WAYS OF LOOKING AT A BLACKBIRD
151  * Wallace Stevens
152  *
153  * I
154  * Among twenty snowy mountains,
155  * The only moving thing
156  * Was the eye of the blackbird.
157  * ...
158  */
159
160 % And start naming them - maybe pointing in a room of taxidermied
161 % coots and grebes, eagles and egrets watching you from
162 % their paper-mached perches.
163
164 colors(["brown","blue","red","golden","crimson","white","black","gray",
165   "yellow","violet"]).
166 birdParts(["tail","wing","head","beak","throat","shoulder","breast",
167      "crest","neck"]).
168 climes(["tropical","arctic","coastal","prairie","river","forest",
169   "mountain"]).
170 cardDirs(["north","south","east","west"]).
171 rarities(["common","uncommon","rare"]).
172 descTypes([coloredPart,clime,cardDir,rarity]).
173 partFeatures(["speckled","mottled","tufted","striped","narrow","large",
174         "bright"]).
175 birdDiets([omnivorous,pescatarian,carnivorous,nectar]).
176 waysOfSinging(["silence","squawking","singing","chattering","tweeting",
177          "screeching","whistling","groaning"]).
178
179 birdFamily_diet(FAMILY,omnivorous):-
```

```
  FAMILY = "thrush";
  FAMILY = "swallow";
  FAMILY = "swift";
  FAMILY = "flycatcher";
  FAMILY = "barbet";
  FAMILY = "tinamou";
  FAMILY = "partridge";
  FAMILY = "grouse";
  FAMILY = "brush-turkey";
  FAMILY = "guineafowl";
  FAMILY = "oriole";
  FAMILY = "woodpecker".

birdFamily_diet(FAMILY,pescatarian):-
  FAMILY = "egret";
  FAMILY = "grebe";
  FAMILY = "coot";
  FAMILY = "duck";
  FAMILY = "shellduck";
  FAMILY = "gull";
  FAMILY = "albatross".

birdFamily_diet(FAMILY,carnivorous):-
  FAMILY = "hawk";
  FAMILY = "eagle";
  FAMILY = "falcon";
  FAMILY = "kestrel";
  FAMILY = "vulture".

birdFamily_diet(FAMILY,nectar):-
  FAMILY = "hummingbird".

climePlaces(["swamps","undergrowth","canopies","rivers","tundra","mountain tops",
       "conifers","estuaries","beaches","bushes","treetops","shrubbery",
       "lakes","reeds","ponds","branches","cliffsides","pine stands"]).

clime_climePlaces("tropical",["swamps","undergrowth","canopies","rivers"]).
clime_climePlaces("arctic",["tundra","mountain tops","conifers"]).
clime_climePlaces("coastal",["estuaries","beaches","undergrowth","bushes"]).
clime_climePlaces("prairie",["treetops","shrubbery","lakes"]).
clime_climePlaces("river",["reeds","ponds","bushes","rivers","lakes"]).
clime_climePlaces("forest",["treetops","undergrowth","bushes","branches"]).
clime_climePlaces("mountain",["cliffsides","pine stands","bushes"]).

diet_habitat_foodSource(omnivorous,"swamps","insects and tubers").
diet_habitat_foodSource(omnivorous,"undergrowth","seeds, worms, and berries").
diet_habitat_foodSource(omnivorous,"canopies","nuts, beetles, and fruit").
diet_habitat_foodSource(omnivorous,"rivers","seeds, berries, and snails").
diet_habitat_foodSource(omnivorous,"tundra","roots and seeds").
diet_habitat_foodSource(omnivorous,"mountain tops","seeds and nuts").
diet_habitat_foodSource(omnivorous,"conifers","nuts, seeds, and beetles").
diet_habitat_foodSource(omnivorous,"estuaries","seeds and some grubs").
diet_habitat_foodSource(omnivorous,"beaches",
      "seeds and driftwood-feeding insects").
diet_habitat_foodSource(omnivorous,"bushes","seeds, grubs, and berries").
diet_habitat_foodSource(omnivorous,"treetops","fruits and nuts").
diet_habitat_foodSource(omnivorous,"shrubbery","seeds and grubs").
diet_habitat_foodSource(omnivorous,"lakes","berries and aquatic insects").
```

```
238 diet_habitat_foodSource(omnivorous,"reeds","grubs and worms").
239 diet_habitat_foodSource(omnivorous,"ponds","insects").
240 diet_habitat_foodSource(omnivorous,"branches","fruits and nuts").
241 diet_habitat_foodSource(omnivorous,"cliffsides","seeds and spiders").
242 diet_habitat_foodSource(omnivorous,"pine stands","pine cones and small
    insects").
243
244 diet_habitat_foodSource(carnivorous,"swamps","amphibians and fish").
245 diet_habitat_foodSource(carnivorous,"undergrowth","rodents").
246 diet_habitat_foodSource(carnivorous,"canopies","small birds").
247 diet_habitat_foodSource(carnivorous,"rivers","fresh-water fish").
248 diet_habitat_foodSource(carnivorous,"tundra",
249       "lemmings, squirrels, and arctic rabbits").
250 diet_habitat_foodSource(carnivorous,"mountain tops","rabbits and small
    birds").
251 diet_habitat_foodSource(carnivorous,"conifers","rodents and wrens").
252 diet_habitat_foodSource(carnivorous,"estuaries","frogs and fish").
253 diet_habitat_foodSource(carnivorous,"beaches","shorebirds").
254 diet_habitat_foodSource(carnivorous,"bushes","rabbits, mice, and gophers").
255 diet_habitat_foodSource(carnivorous,"treetops",
256       "squirrels, mice, and other birds").
257 diet_habitat_foodSource(carnivorous,"shrubbery","rabbits and mice").
258 diet_habitat_foodSource(carnivorous,"lakes","fish and frugs").
259 diet_habitat_foodSource(carnivorous,"reeds","rodents and lizards").
260 diet_habitat_foodSource(carnivorous,"ponds","fish, frogs, rodents, and
    lizards").
261 diet_habitat_foodSource(carnivorous,"branches","squirrels").
262 diet_habitat_foodSource(carnivorous,"cliffsides","other birds").
263 diet_habitat_foodSource(carnivorous,"pine stands","flocks of small birds").
264
265 diet_habitat_foodSource(pescatarian,"swamps",
266       "catfish, bass, sunfish, and minnows").
267 diet_habitat_foodSource(pescatarian,"undergrowth","freshwater fish").
268 diet_habitat_foodSource(pescatarian,"canopies","trout, flounder, and
    perch").
269 diet_habitat_foodSource(pescatarian,"rivers","trout and other freshwater
    fish").
270 diet_habitat_foodSource(pescatarian,"tundra","salmon and mackerel").
271 diet_habitat_foodSource(pescatarian,"mountain tops",
272       "brittlefish, lanternfish, and eelouts").
273 diet_habitat_foodSource(pescatarian,"conifers","trout, salamander, and
    snails").
274 diet_habitat_foodSource(pescatarian,"estuaries","smelt, bass, and
    snappers").
275 diet_habitat_foodSource(pescatarian,"beaches",
276       "crabs, mussels, and a variety of saltwater fish").
277 diet_habitat_foodSource(pescatarian,"bushes","freshwater fish").
278 diet_habitat_foodSource(pescatarian,"treetops","freshwater fish").
279 diet_habitat_foodSource(pescatarian,"shrubbery","freshwater fish").
280 diet_habitat_foodSource(pescatarian,"lakes","berries and aquatic insects").
281 diet_habitat_foodSource(pescatarian,"reeds","carp, bream, trout, and
    perch").
282 diet_habitat_foodSource(pescatarian,"ponds","catfish, bass, and carp").
283 diet_habitat_foodSource(pescatarian,"branches","freshwater fish").
284 diet_habitat_foodSource(pescatarian,"cliffsides","rockfish and skates").
285 diet_habitat_foodSource(pescatarian,"pine stands","freshwater fish").
286
287 diet_habitat_foodSource(nectar,_,"the nectar of wildflowers").
288
289 /*
```

```
 * THIRTEEN WAYS OF LOOKING AT A BLACKBIRD
 * Wallace Stevens
 *
 * I
 * Among twenty snowy mountains,
 * The only moving thing
 * Was the eye of the blackbird.
 *
 * II
 * I was of three minds,
 * Like a tree
 * In which there are three blackbirds
 * ...
 */

% But, standing in rain-pants in some swamp, hopeful binoculars held
% chest high, what wings will you spot silhouetted, under
% bush or over roof?

birdFamily_seed("hummingbird",SEED):- SEED =< 0.01.
birdFamily_seed("thrush",SEED):- SEED >= 0.01, SEED < 0.08.
birdFamily_seed("tinamou",SEED):- SEED >= 0.08, SEED < 0.1.
birdFamily_seed("egret",SEED):- SEED >= 0.1, SEED < 0.15.
birdFamily_seed("oriole",SEED):- SEED >= 0.15, SEED < 0.2.
birdFamily_seed("hawk",SEED):- SEED >= 0.2, SEED < 0.28.
birdFamily_seed("kestrel",SEED):- SEED >= 0.28, SEED < 0.3.
birdFamily_seed("eagle",SEED):- SEED >= 0.3, SEED < 0.35.
birdFamily_seed("duck",SEED):- SEED >= 0.35, SEED < 0.41.
birdFamily_seed("falcon",SEED):- SEED >= 0.41, SEED < 0.42.
birdFamily_seed("partridge",SEED):- SEED >= 0.42, SEED < 0.45.
birdFamily_seed("brush-turkey",SEED):- SEED >= 0.45, SEED < 0.46.
birdFamily_seed("grebe",SEED):- SEED >= 0.46, SEED < 0.5.
birdFamily_seed("coot",SEED):- SEED >= 0.5, SEED < 0.55.
birdFamily_seed("swallow",SEED):- SEED >= 0.55, SEED < 0.63.
birdFamily_seed("grouse",SEED):- SEED >= 0.63, SEED < 0.66.
birdFamily_seed("guineafowl",SEED):- SEED >= 0.66, SEED < 0.69.
birdFamily_seed("shellduck",SEED):- SEED >= 0.69, SEED < 0.71.
birdFamily_seed("woodpecker",SEED):- SEED >= 0.71, SEED < 0.75.
birdFamily_seed("barbet",SEED):- SEED >= 0.75, SEED < 0.76.
birdFamily_seed("vulture",SEED):- SEED >= 0.76, SEED < 0.8.
birdFamily_seed("gull",SEED):- SEED >= 0.8, SEED < 0.85.
birdFamily_seed("flycatcher",SEED):- SEED >= 0.85, SEED < 0.90.
birdFamily_seed("swift",SEED):- SEED >= 0.9, SEED < 0.99.
birdFamily_seed("albatross",SEED):- SEED >= 0.99.

color_seed("brown",SEED):- SEED < 0.15.
color_seed("blue",SEED):- SEED >= 0.15, SEED < 0.2.
color_seed("red",SEED):- SEED >= 0.2, SEED < 0.35.
color_seed("golden",SEED):- SEED >= 0.35, SEED < 0.5.
color_seed("crimson",SEED):- SEED >= 0.5, SEED < 0.55.
color_seed("white",SEED):- SEED >= 0.55, SEED < 0.65.
color_seed("black",SEED):- SEED >= 0.65, SEED < 0.75.
color_seed("gray",SEED):- SEED >= 0.75, SEED < 0.8.
color_seed("yellow",SEED):- SEED >= 0.8, SEED < 0.95.
color_seed("violet",SEED):- SEED >= 0.95.

birdPart_seed("tail",SEED):- SEED < 0.15.
birdPart_seed("wing",SEED):- SEED >= 0.15, SEED < 0.2.
birdPart_seed("head",SEED):- SEED >= 0.2, SEED < 0.25.
birdPart_seed("beak",SEED):- SEED >= 0.25, SEED < 0.4.
```

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birdPart_seed("throat",SEED):- SEED >= 0.4, SEED < 0.55.
birdPart_seed("shoulder",SEED):- SEED >= 0.55, SEED < 0.7.
birdPart_seed("breast",SEED):- SEED >= 0.7, SEED < 0.8.
birdPart_seed("crest",SEED):- SEED >= 0.8, SEED < 0.9.
birdPart_seed("neck",SEED):- SEED >= 0.9.

clime_seed("tropical",SEED):- SEED < 0.15.
clime_seed("arctic",SEED):- SEED >= 0.15, SEED < 0.3.
clime_seed("coastal",SEED):- SEED >= 0.3, SEED < 0.55.
clime_seed("prairie",SEED):- SEED >= 0.55, SEED < 0.65.
clime_seed("river",SEED):- SEED >= 0.65, SEED < 0.75.
clime_seed("forest",SEED):- SEED >= 0.75, SEED < 0.85.
clime_seed("mountain",SEED):- SEED >= 0.85.

cardDir_seed("north",SEED):- SEED < 0.25.
cardDir_seed("south",SEED):- SEED >= 0.25, SEED < 0.5.
cardDir_seed("east",SEED):- SEED >= 0.5, SEED < 0.75.
cardDir_seed("west",SEED):- SEED >= 0.75.

rarity_seed("common",SEED):- SEED < 0.65.
rarity_seed("uncommon",SEED):- SEED >= 0.65, SEED < 0.85.
rarity_seed("rare",SEED):- SEED >= 0.85, SEED < 0.96.
rarity_seed("extinct",SEED):- SEED >= 0.97.

descType_seed(coloredPart,SEED):- SEED < 0.45.
descType_seed(clime, SEED):- SEED >= 0.45, SEED < 0.65.
descType_seed(cardDir, SEED):- SEED >= 0.65, SEED < 0.8.
descType_seed(rarity, SEED):- SEED >= 0.8, SEED < 0.91.
descType_seed(wayOfSinging, SEED) :- SEED >= 0.91.

partFeature_seed("speckled",SEED):- SEED < 0.2.
partFeature_seed("mottled",SEED):- SEED >= 0.2, SEED < 0.3.
partFeature_seed("tufted",SEED):- SEED >= 0.3, SEED < 0.4.
partFeature_seed("striped",SEED):- SEED >= 0.4, SEED < 0.6.
partFeature_seed("narrow",SEED):- SEED >= 0.6, SEED < 0.8.
partFeature_seed("oversized",SEED):- SEED >= 0.8.

wayOfSinging_seed("silent",SEED):- SEED < 0.01.
wayOfSinging_seed("squawking",SEED):- SEED >= 0.01, SEED < 0.2.
wayOfSinging_seed("singing",SEED):- SEED >= 0.2, SEED < 0.5.
wayOfSinging_seed("chattering",SEED):- SEED >= 0.5, SEED < 0.65.
wayOfSinging_seed("tweeting",SEED):- SEED >= 0.65, SEED < 0.75.
wayOfSinging_seed("screeching",SEED):- SEED >= 0.75, SEED < 0.85.
wayOfSinging_seed("whistling",SEED):- SEED >= 0.85, SEED < 0.95.
wayOfSinging_seed("groaning",SEED):- SEED >= 0.95.

% You are building the birdhouse, and painting it brown; buying from
% Lowe's open air, green-tarp shaded gardening section a bag of
% birdseeds; filling the little bowl with water; filling the floor with
% the seeds; seeing if something comes (hoping it isn't a squirrel;
% throwing dirt clods at it if it is; standing silently behind the tall
% window if not); teaching a chicken to scream.

a_birdFamily(BIRD_FAMILY):- random(S), birdFamily_seed(BIRD_FAMILY,S).
a_color(COLOR):- random(S), color_seed(COLOR,S).
a_birdPart(BIRD_PART):- random(S), birdPart_seed(BIRD_PART,S).
a_clime(CLIME):- random(S), clime_seed(CLIME,S).
a_cardDir(CARD_DIR):- random(S), cardDir_seed(CARD_DIR,S).
a_rarity(RARITY):- random(S), rarity_seed(RARITY,S).
a_descType(DESC_TYPE):- random(S), descType_seed(DESC_TYPE,S).
```

```
410 a_partFeature(PART_FEATURE):- random(S), partFeature_seed(PART_FEATURE,S).
411 a_wayOfSinging(WAY_OF_SINGING):- random(S),
    wayOfSinging_seed(WAY_OF_SINGING,S).
412
413 /*
414  * THIRTEEN WAYS OF LOOKING AT A BLACKBIRD
415  * Wallace Stevens
416  *
417  * I
418  * Among twenty snowy mountains,
419  * The only moving thing
420  * Was the eye of the blackbird.
421  *
422  * II
423  * I was of three minds,
424  * Like a tree
425  * In which there are three blackbirds
426  *
427  * III
428  * The blackbird whirled in the autumn winds.
429  * It was a small part of the pantomime.
430  * ...
431  */
432
433 % Walking towards the feathered thing a step at a time, crunching no
434 % twigs, you place the binoculars over your eyes and rub at the central
435 % dials until you can distinguish leaf from leaf and feather from
436 % feather in the crook of the old oak. Standing in a city rock doves
437 % with green glimmering throats twitter around you; under the ornamental
438 % bridge, gliding mallards congregate; to the dead hedgehog flesh-headed
439 % vultures swoop. On imagined branches that flicker, wingless blackbirds
440 % land
441
442
443 an_attribute_desc(family,[A_FAMILY_FOR_THAT_BIRD_AUNTS_UNCLES_SIBLINGS]):-
444   a_birdFamily(A_FAMILY_FOR_THAT_BIRD_AUNTS_UNCLES_SIBLINGS).
445 an_attribute_desc(coloredPart,[A_PART_OF_THAT_BIRD,
    A_COLOR_OF_A_PART_OF_THAT_BIRD]):-
446   a_birdPart(A_PART_OF_THAT_BIRD), a_color(A_COLOR_OF_A_PART_OF_THAT_BIRD).
447 an_attribute_desc(clime,[A_PREFERRED_KIND_OF_WIND_AND_VEGETATION]):-
448   a_clime(A_PREFERRED_KIND_OF_WIND_AND_VEGETATION).
449 an_attribute_desc(rarity,[WHAT_MULTITUDES]):-
450   a_rarity(WHAT_MULTITUDES).
451 an_attribute_desc(cardDir,[HOLD_A_COMPASS_UNDER_IT]):-
452   a_cardDir(HOLD_A_COMPASS_UNDER_IT).
453 an_attribute_desc(wayOfSinging,[DESCRIBE_ITS_NOISES]):-
454   a_wayOfSinging(DESCRIBE_ITS_NOISES).
455
456 % There may be other and contaminating rooms: the metaphor-logic
457 % mentions odd flecks, leaves, wind-rustles, cloud-pockets. Throat
458 % feathers all ragged and rippling, if you remember interiors
459
460 desc_name(coloredPart,[THE_PART,THE_COLOR],THE_DESC_STR):-
461   strs_flatten([THE_COLOR,"-",THE_PART,"ed"],THE_DESC_STR).
462 desc_name(clime, [THE_CLIME], THE_DESC_STR):-
463   THE_DESC_STR = THE_CLIME.
464 desc_name(cardDir, [THE_CARD_DIR], THE_DESC_STR):-
465   strs_flatten([THE_CARD_DIR,"ern"],THE_DESC_STR).
466 desc_name(rarity, [THE_RARITY], THE_DESC_STR):-
467   THE_DESC_STR = THE_RARITY.
```

```
desc_name(family, [THE_FAMILY], THE_DESC_STR):-
  THE_DESC_STR = THE_FAMILY.
desc_name(wayOfSinging, [THE_WAY_OF_SINGING], THE_DESC_STR):-
  THE_DESC_STR = THE_WAY_OF_SINGING.

% The Juan Fernandez firecrown in the Juan Fernandez Islands, named
% after the Spanish explorer Juan Fernandez, is a hummingbird only
% spotted on the island Isla de Robinson Crusoe, named after Robinson
% Crusoe, owned by Chile which was named "Chile" by the Spanish
% possibly from the Incan naming of a valley "Chili," a corruption of
% the name of a Picunche chief Tili, or which may be named from a
% Mapuche word "chilli" for "where the land ends," a Quechua word
% "chiri" or "tchilli" for "cold" or "snow," or for the onomatopoeic
% "cheele-cheele" for the warble of a bird known as the "trile"


/*
 * THIRTEEN WAYS OF LOOKING AT A BLACKBIRD
 * Wallace Stevens
 *
 * I
 * Among twenty snowy mountains,
 * The only moving thing
 * Was the eye of the blackbird.
 *
 * II
 * I was of three minds,
 * Like a tree
 * In which there are three blackbirds
 *
 * III
 * The blackbird whirled in the autumn winds.
 * It was a small part of the pantomime.
 *
 * IV
 * A man and a woman are one.
 * A man and a woman and a
 * blackbird
 * Are one.
 *
 * V
 * I do not know which to prefer,
 * The beauty of inflections
 * Or the beauty of innuendoes,
 * The blackbird whistling
 * Or just after.
 * ...
 *
 * (I wanted to change the "man" and "woman" in the 4th one to [PERSON],
 * but i don't know .. it would have been dishonest i guess (maybe a
 * useful reminder that you can watch so many birds' wings and still be
 * stuck in human time and things))
 *
 * -- I genuinely do not whether my experience, my life, licenses me
 * -- to or to not write about certain violences (because, of course,
 * -- it matters); the experiences are all neither/and, both/or. I will
 * -- Everything I loved here I hate (full analogy between code and
 * -- language; lyricized innuendo; certain old-boy poets; logicism). I
 * -- tell myself I will not let myself love things without knowing why
 * -- I love things, but I continue to become fascinated by, immersed
```

```
 * -- in things, without seriously sustaining a critical thought about
 * -- why I so want to immerse in it, what I am trying to go into and
 * -- away from.
 */

% Now, sitting behind your backyard
% window, with an extra page accidentally printed - you get a pencil,
% and start finding the bird's shape. Taking out the tin khit
% of caked watercolors, you brush in, moving from light to dark in quick
% washes. The bird will fly away before you're done, but probably no one
% will notice the imprecisions of pigment and proportion its absence
% leaves.

% -- I do not reject my end-of-teenage syntax. I detect an ear in it.

birdPart(BIRD_PART):-
  birdParts(THE_BPARTS),
  member(BIRD_PART,THE_BPARTS).

that_piece_of_that_bird_in_a_color(THAT_PIECE_OF_THAT_BIRD,
[THAT_PIECE_OF_THAT_BIRD,IN_A_COLOR]):-
  birdPart(THAT_PIECE_OF_THAT_BIRD),
  a_color(IN_A_COLOR).

colors_of_parts_of_a_bird(THE_PIECES_IN_SOME_COLORS):-
  birdParts(THE_PIECES_OF_THAT_BIRD),

maplist(that_piece_of_that_bird_in_a_color,THE_PIECES_OF_THAT_BIRD,THE_PIECE
S_IN_SOME_COLORS).

% Now, it is well known that your blue and my blue may or may not be the
% same blue, but, beyond cliched thought experiment, after examining
% rods and cones and counting them and wave lenghts and performing some
% similar procedures we also know that most birds see some different
% and ultraviolet shades of blue and off-blue and possess plumage
% reflecting some of these ultraviolet colors. You will not see this
% ultraviolet stripe on a chickadee and you will not have a word for it.

name_for(clime,NAME_IT,_,_,LOCATE_IT,_,FIND_ITS_RELATIONS,_):-
  desc_name(clime,LOCATE_IT,NAME_THE_PLACE),
  desc_name(family,FIND_ITS_RELATIONS,NAME_THE_RELATIONS),
  strs_flatten([NAME_THE_PLACE," ",NAME_THE_RELATIONS],NAME_IT).

name_for(cardDir,NAME_IT,_,_,_,POINT,FIND_ITS_RELATIONS,_):-
  desc_name(cardDir,POINT,NAME_THE_DIR),
  desc_name(family,FIND_ITS_RELATIONS,NAME_THE_RELATIONS),
  strs_flatten([NAME_THE_DIR," ",NAME_THE_RELATIONS],NAME_IT).

name_for(rarity,NAME_IT,_,COUNT_IT,_,_,FIND_ITS_RELATIONS,_):-
  desc_name(rarity,COUNT_IT,NAME_THE_NUMBER),
  desc_name(family,FIND_ITS_RELATIONS,NAME_THE_RELATIONS),
  strs_flatten([NAME_THE_NUMBER," ",NAME_THE_RELATIONS],NAME_IT).

name_for(coloredPart,NAME_IT,COLOR_IT,_,_,_,FIND_ITS_RELATIONS,_):-
  member(THE_COLORED_PART,COLOR_IT),
  desc_name(coloredPart,THE_COLORED_PART,NAME_THE_COLORED_PART),
  desc_name(family,FIND_ITS_RELATIONS,NAME_THE_RELATIONS),
  strs_flatten([NAME_THE_COLORED_PART," ",NAME_THE_RELATIONS],NAME_IT).

name_for(wayOfSinging,NAME_IT,_,_,_,_,FIND_ITS_RELATIONS,LISTEN_TO_IT):-
```

```
585   desc_name(wayOfSinging,LISTEN_TO_IT,HEAR_IT),
586   desc_name(family,FIND_ITS_RELATIONS,NAME_THE_RELATIONS),
587   strs_flatten([HEAR_IT," ",NAME_THE_RELATIONS],NAME_IT).
588
589 a_name_ofType(clime,NAME_IT,COLOR_IT,COUNT_IT,LOCATE_IT,POINT,FIND_ITS_RELATIONS,LISTEN_TO_IT):-
590
    name_for(clime,NAME_IT,COLOR_IT,COUNT_IT,LOCATE_IT,POINT,FIND_ITS_RELATIONS,LISTEN_TO_IT).
591
592 a_name_ofType(cardDir,NAME_IT,COLOR_IT,COUNT_IT,LOCATE_IT,POINT,FIND_ITS_RELATIONS,LISTEN_TO_IT):-
593
    name_for(cardDir,NAME_IT,COLOR_IT,COUNT_IT,LOCATE_IT,POINT,FIND_ITS_RELATIONS,LISTEN_TO_IT).
594
595 a_name_ofType(rarity,NAME_IT,COLOR_IT,COUNT_IT,LOCATE_IT,POINT,FIND_ITS_RELATIONS,LISTEN_TO_IT):-
596
    name_for(rarity,NAME_IT,COLOR_IT,COUNT_IT,LOCATE_IT,POINT,FIND_ITS_RELATIONS,LISTEN_TO_IT).
597
598 a_name_ofType(coloredPart,NAME_IT,COLOR_IT,_,_,_,FIND_ITS_RELATIONS,_):-
599   a_birdPart(SOME_PART),
600   THE_COLORED_PART = [SOME_PART,_],
601   member(THE_COLORED_PART,COLOR_IT),
602   desc_name(coloredPart,THE_COLORED_PART,NAME_THE_COLORED_PART),
603   desc_name(family,FIND_ITS_RELATIONS,NAME_THE_RELATIONS),
604   strs_flatten([NAME_THE_COLORED_PART," ",NAME_THE_RELATIONS],NAME_IT).
605
606 a_name_ofType(wayOfSinging,NAME_IT,COLOR_IT,COUNT_IT,LOCATE_IT,POINT,FIND_ITS_RELATIONS,LISTEN_TO_IT):-
607
    name_for(wayOfSinging,NAME_IT,COLOR_IT,COUNT_IT,LOCATE_IT,POINT,FIND_ITS_RELATIONS,LISTEN_TO_IT).
608
609 % One from the Spring flock on the nearby tree lands in front of you -
610 % brown-winged, white-throated, large as a butternut squash. When you
611 % step towards it, it leaps an equal amount back. When you step away, it
612 % steps the same distance forward. When your steps approach it twice it
613 % flaps back up into the crowded tree.
614
615 a_bird(NAME,COLORS,COUNT,LOCATE,POINT,FIND_RELATIONS,WEIGH_IT,INDEX_IT,HEAR_IT):-
616   colors_of_parts_of_a_bird(COLORS),
617   an_attribute_desc(rarity,COUNT),
618   an_attribute_desc(clime,LOCATE),
619   an_attribute_desc(cardDir,POINT),
620   an_attribute_desc(family,FIND_RELATIONS),
621   an_attribute_desc(wayOfSinging,HEAR_IT),
622   a_descType(A_NAME_TYPE),
623   random_between(1,10,WEIGH_IT),
624
    a_name_ofType(A_NAME_TYPE,NAME,COLORS,COUNT,LOCATE,POINT,FIND_RELATIONS,HEAR_IT),
625   INDEX_IT >= 1.
626
627 a_bird_ofFamily(NAME,COLORS,COUNT,LOCATE,POINT,ITS_RELATIONS,WEIGH_IT,INDEX_IT,HEAR_IT):-
628   colors_of_parts_of_a_bird(COLORS),
```

```
629   an_attribute_desc(rarity,COUNT),
630   an_attribute_desc(clime,LOCATE),
631   an_attribute_desc(cardDir,POINT),
632   an_attribute_desc(wayOfSinging,HEAR_IT),
633   a_descType(A_NAME_TYPE),
634   random_between(1,10,WEIGH_IT),
635
    a_name_ofType(A_NAME_TYPE,NAME,COLORS,COUNT,LOCATE,POINT,ITS_RELATIONS,HEAR_
    IT),
636   INDEX_IT >= 1.
637
638 list_bird(ABOUT_A_BIRD,NAME,COLORS,COUNT,LOCATE,POINT,FIND_RELATIONS,WEIGH_I
    T,INDEX_IT,LISTEN_TO_IT):-
639   ABOUT_A_BIRD =
    [NAME,COLORS,COUNT,LOCATE,POINT,FIND_RELATIONS,WEIGH_IT,INDEX_IT,LISTEN_TO_I
    T].
640
641 birdList_birdName(LISTED_BIRD,ITS_NAME):-
642   nth0(0,LISTED_BIRD,ITS_NAME).
643
644 birdList_birdColors(LISTED_BIRD,ITS_COLORS):-
645   nth0(1,LISTED_BIRD,ITS_COLORS).
646
647 birdList_birdRarity(LISTED_BIRD,ITS_RARITY):-
648   nth0(2,LISTED_BIRD,ITS_RARITY).
649
650 birdList_birdClime(LISTED_BIRD,ITS_CLIME):-
651   nth0(3,LISTED_BIRD,ITS_CLIME).
652
653 birdList_birdDir(LISTED_BIRD,ITS_DIR):-
654   nth0(4,LISTED_BIRD,ITS_DIR).
655
656 birdList_birdFamily(LISTED_BIRD,ITS_FAMILY):-
657   nth0(5,LISTED_BIRD,ITS_FAMILY).
658
659 birdList_birdSize(LISTED_BIRD,ITS_SIZE):-
660   nth0(6,LISTED_BIRD,ITS_SIZE).
661
662 birdList_birdIndex(LISTED_BIRD,ITS_SIZE):-
663   nth0(7,LISTED_BIRD,ITS_SIZE).
664
665 birdList_birdSinging(LISTED_BIRD,ITS_SINGING):-
666   nth0(8,LISTED_BIRD,ITS_SINGING).
667
668 % To identify a bird quickly, note the shape of the wings in profile,
669 % black against sunlight; or count toes; forget the background tree,
670 % forget the ruffle of feathers, but maybe count a flock; dappled
671 % sunlight is distracting but removing it, as painters but not
672 % cameras do, the distinction between speckled and striped is a good
673 % way to tell thrush from thrush; the difference, between 2 and 5 cm, in
674 % the length of a white brow stripe can identify Siberian from East
675 % Asian variants of a swallow; plumage patterns of the juvenile are
676 % different and require another chart.
677
678 a_birdList(ABOUT_A_BIRD):-
679   a_bird(NAME,COLORS,COUNT,LOCATE,POINT,FIND_RELATIONS,WEIGH_IT,1,SNG),
680
    list_bird(ABOUT_A_BIRD,NAME,COLORS,COUNT,LOCATE,POINT,FIND_RELATIONS,WEIGH_I
    T,1,SNG).
681
```

```
682 a_birdListNum(ABOUT_A_BIRD,THE_INDEX):-
683
    a_bird(NAME,COLORS,COUNT,LOCATE,POINT,FIND_RELATIONS,WEIGH_IT,THE_INDEX,LIST
    EN_TO_IT),
684
    list_bird(ABOUT_A_BIRD,NAME,COLORS,COUNT,LOCATE,POINT,FIND_RELATIONS,WEIGH_I
    T,THE_INDEX,LISTEN_TO_IT).
685
686 a_birdList_ofFamilyNum(ITS_RELATIONS,ABOUT_A_BIRD,THE_INDEX):-
687
    a_bird_ofFamily(NAME,COLORS,COUNT,LOCATE,POINT,ITS_RELATIONS,WEIGH_IT,THE_IN
    DEX,LISTEN_TO_IT),
688
    list_bird(ABOUT_A_BIRD,NAME,COLORS,COUNT,LOCATE,POINT,ITS_RELATIONS,WEIGH_IT
    ,THE_INDEX,LISTEN_TO_IT).
689
690 a_relationListNum(OLD_BIRD,RELATED_BIRD,THE_INDEX):-
691   birdList_birdFamily(OLD_BIRD,THE_FAM),
692   a_birdList_ofFamilyNum(THE_FAM,RELATED_BIRD,THE_INDEX).
693
694 % Consider a bird through a window. It's a small fluffed mass -
695 % vibrating, folded up. Lacking better names for it, call it A Little
696 % Brown Thing.
697
698 bird_sociability(ITS_NAME,"solitary"):-
699   string_length(ITS_NAME,NAME_LENGTH),
700   13 >= NAME_LENGTH.
701
702 bird_sociability(ITS_NAME,"semi-solitary"):-
703   string_length(ITS_NAME,NAME_LENGTH),
704   NAME_LENGTH > 13,
705   17 >= NAME_LENGTH.
706
707 bird_sociability(ITS_NAME,"flocking"):-
708   string_length(ITS_NAME,NAME_LENGTH),
709   NAME_LENGTH >= 17.
710
711 sociability_descriptor("solitary",DESCRIPTOR):-
712   random_member(DESCRIPTOR,["alone","in solitude","singley"]).
713
714 sociability_descriptor("semi-solitary",DESCRIPTOR):-
715   random_member(DESCRIPTOR,["in pairs","with a few of their
    kind","individually or in small groups"]).
716
717 sociability_descriptor("flocking",DESCRIPTOR):-
718   random_member(DESCRIPTOR,["with many of their kind","in flocks","in large
    congregations"]).
719
720 behaviour_type(BEHAVIOUR_INT,"inter-species"):-
721   0 is BEHAVIOUR_INT mod 7.
722
723 behaviour_type(BEHAVIOUR_INT,"nesting"):-
724   1 is BEHAVIOUR_INT mod 7.
725
726 behaviour_type(BEHAVIOUR_INT,"flight"):-
727   2 is BEHAVIOUR_INT mod 7.
728
729 behaviour_type(BEHAVIOUR_INT,"migratory"):-
730   3 is BEHAVIOUR_INT mod 7.
731
```

```
732 behaviour_type(BEHAVIOUR_INT,"mating"):-
733   4 is BEHAVIOUR_INT mod 7.
734
735 behaviour_type(BEHAVIOUR_INT,"human"):-
736   5 is BEHAVIOUR_INT mod 7.
737
738 behaviour_type(BEHAVIOUR_INT,"misc"):-
739   6 is BEHAVIOUR_INT mod 7.
740
741 nesting_material(SEED_INT,THE_MATERIAL):-
742   MOD3 is SEED_INT mod 3,
743   nth0(MOD3,["dead twigs and leaves","branches","moss, wool, fabric, plant
    fluff, or string"],THE_MATERIAL).
744
745 nest_type(SEED_INT,NEST_TYPE):-
746   MOD5 is SEED_INT mod 5,
747   nth0(MOD5,["flat platforms composed of ","suspended structures woven from
    ","natural cavities in trees filled out with ", "depressions in the ground
    covered over by ", "tall and loosely built nests of "],NEST_TYPE).
748
749 of_type_behaviour(BEHAVIOUR_INT,"inter-species",ITS_BEHAVIOUR):-
750   0 is BEHAVIOUR_INT mod 3,
751   a_birdList(SOME_OTHER_BIRD),
752   birdList_birdName(SOME_OTHER_BIRD,OTHER_NAME),
753   random_member(MINGLE,["mingle with","walk among","stand around"]),
754   strs_flatten(["often ",MINGLE," groups of
    ",OTHER_NAME,"s"],ITS_BEHAVIOUR).
755
756 of_type_behaviour(BEHAVIOUR_INT,"inter-species",ITS_BEHAVIOUR):-
757   1 is BEHAVIOUR_INT mod 3,
758   a_birdList(SOME_OTHER_BIRD),
759   birdList_birdName(SOME_OTHER_BIRD,OTHER_NAME),
760   strs_flatten(["are found around the homes of the
    ",OTHER_NAME],ITS_BEHAVIOUR).
761
762 of_type_behaviour(BEHAVIOUR_INT,"inter-species",ITS_BEHAVIOUR):-
763   2 is BEHAVIOUR_INT mod 3,
764   a_birdList(SOME_OTHER_BIRD),
765   birdList_birdName(SOME_OTHER_BIRD,OTHER_NAME),
766   strs_flatten(["are a brood parasite, leaving their eggs in nests of the
    ",OTHER_NAME, " rather than raising their own young"],ITS_BEHAVIOUR).
767
768 of_type_behaviour(BEHAVIOUR_INT,"nesting",ITS_BEHAVIOUR):-
769   nesting_material(BEHAVIOUR_INT,THE_MATERIAL),
770   nest_type(BEHAVIOUR_INT,NEST_TYPE),
771   strs_flatten(["make their homes in
    ",NEST_TYPE,THE_MATERIAL],ITS_BEHAVIOUR).
772
773 of_type_behaviour(BEHAVIOUR_INT,"flight","have lost the capacity for
    flight"):-
774   0 is BEHAVIOUR_INT mod 3.
775
776 of_type_behaviour(BEHAVIOUR_INT,"flight",ITS_BEHAVIOUR):-
777   1 is BEHAVIOUR_INT mod 3,
778   MOD5 is BEHAVIOUR_INT mod 5,
779   nth0(MOD5,["high","low","rapidly","slowly","zigzaggingly"],FLIGHT_KIND),
780   strs_flatten(["fly ",FLIGHT_KIND],ITS_BEHAVIOUR).
781
782 of_type_behaviour(BEHAVIOUR_INT,"flight",ITS_BEHAVIOUR):-
783   2 is BEHAVIOUR_INT mod 3,
```

```
  MOD4 is BEHAVIOUR_INT mod 4,
  MOD5 is BEHAVIOUR_INT mod 5,
  nth0(MOD4,["hot","rising","cold","vorticial"],AIR_TYPE),
  nth0(MOD5,["high","low","rapidly","slowly","zigzaggingly"],FLIGHT_KIND),
  strs_flatten(["seek ",AIR_TYPE, " currents of wind to fly ",FLIGHT_KIND, "
on"],ITS_BEHAVIOUR).

of_type_behaviour(BEHAVIOUR_INT,"migratory",ITS_BEHAVIOUR):-
  MOD3 is BEHAVIOUR_INT mod 3,
  MOD4 is BEHAVIOUR_INT mod 4,
  MOD5 is BEHAVIOUR_INT mod 5,
  MOD6 is BEHAVIOUR_INT mod 6,
  cardDirs(CARD_DIRS),
  nth0(MOD4,CARD_DIRS,WHICH_DIR),
  capitalize_first(WHICH_DIR,MIGRATION_DIR),
  nth0(MOD5,["around a pond, across a field, or to the other side of a
mountain to the ",
      "short distances to better nesting grounds further ",
      "reasonable distances ",
      "long distances annualy to the same sites in the ",
      "without rest accross continents and over oceans "],
        MIGRATION_DIST),
  nth0(MOD6,[", to raise their young",", to mate",
        ", to withstand the weather",
        ", to find food",", to avoid predators",", to perish"],
       MIGRATION_REASONS),
  nth0(MOD3,["winter","spring","fall"],MIGRATION_SEASON),
  strs_flatten(["travel ",MIGRATION_DIST,MIGRATION_DIR,
           " in the ",MIGRATION_SEASON, MIGRATION_REASONS],
         ITS_BEHAVIOUR).

of_type_behaviour(BEHAVIOUR_INT,"human",ITS_BEHAVIOUR):-
  1450 >= BEHAVIOUR_INT,
  MOD3 is BEHAVIOUR_INT mod 3,
  nth0(MOD3,["cities","towns","suburbs"],HUMAN_PLACE),
  strs_flatten(["thrive in ",HUMAN_PLACE],ITS_BEHAVIOUR).

of_type_behaviour(BEHAVIOUR_INT,"human",ITS_BEHAVIOUR):-
  BEHAVIOUR_INT > 1450,
  1550 >= BEHAVIOUR_INT,
  MOD5 is BEHAVIOUR_INT mod 5,
  nth0(MOD5,["conservation programs","environmental legislation",
       "the protection of their nesting grounds",
       "breeding and reintroduction programs",
       "the returning availability of their preferred foods"],
      HUMAN_HELP),
  strs_flatten(["have begun to rebound due to ",HUMAN_HELP],ITS_BEHAVIOUR).

of_type_behaviour(BEHAVIOUR_INT,"human",ITS_BEHAVIOUR):-
  BEHAVIOUR_INT > 1550,
  1725 >= BEHAVIOUR_INT,
  MOD5 is BEHAVIOUR_INT mod 5,
  nth0(MOD5,["pesticide use","the dissapearance of their prey",
       "the human settlement of their nesting grounds",
       "extensive hunting",
       "unknown but presumably human caused changes"],
      HUMAN_HURT),
  strs_flatten(["have been devastated by ",HUMAN_HURT],ITS_BEHAVIOUR).

of_type_behaviour(BEHAVIOUR_INT,"human",ITS_BEHAVIOUR):-
```

```
  BEHAVIOUR_INT > 1725,
  2000 >= BEHAVIOUR_INT,
  MOD3 is BEHAVIOUR_INT mod 3,
  MOD5 is BEHAVIOUR_INT mod 5,
  nth0(MOD3,["farmland","backyards","ranches"],FIRST_OUTSKIRT),
  nth0(MOD5,["lakesides","onto telephone wires","beaches","golf courses",
       "roofs"],SECOND_OUTSKIRT),
  strs_flatten(["live on human outskirts, sometimes venturing into ",
          FIRST_OUTSKIRT," or ",SECOND_OUTSKIRT],ITS_BEHAVIOUR).

of_type_behaviour(BEHAVIOUR_INT,"human","only survive far from human
populations"):-
  BEHAVIOUR_INT > 2000.

of_type_behaviour(_,"mating","mate at the correct times with great theatrics
and zeal").

of_type_behaviour(BEHAVIOUR_INT,"misc","seem to to do nothing at all"):-
  0 is BEHAVIOUR_INT mod 2,
  0 is BEHAVIOUR_INT mod 3.

of_type_behaviour(BEHAVIOUR_INT,"misc","are very shy birds, almost
impossible to approach"):-
  1 is BEHAVIOUR_INT mod 2,
  0 is BEHAVIOUR_INT mod 3.

of_type_behaviour(BEHAVIOUR_INT,"misc","will congregate and gratefully eat
if fed"):-
  0 is BEHAVIOUR_INT mod 2,
  1 is BEHAVIOUR_INT mod 3.

of_type_behaviour(BEHAVIOUR_INT,"misc","will steal sandwiches"):-
  1 is BEHAVIOUR_INT mod 2,
  1 is BEHAVIOUR_INT mod 3.

of_type_behaviour(BEHAVIOUR_INT,"misc","can always find their way home"):-
  0 is BEHAVIOUR_INT mod 2,
  2 is BEHAVIOUR_INT mod 3.

of_type_behaviour(BEHAVIOUR_INT,"misc","collect bright trinkets found in the
dirt"):-
  1 is BEHAVIOUR_INT mod 2,
  2 is BEHAVIOUR_INT mod 3.


of_type_behaviour(_,_,"").

bird_behaviour(ITS_NAME,ITS_BEHAVIOUR):-
  string_codes(ITS_NAME,ITS_NUMBERS),
  sum_list(ITS_NUMBERS,BEHAVIOUR_INT),
  behaviour_type(BEHAVIOUR_INT,BEHAVIOUR_TYPE),
  of_type_behaviour(BEHAVIOUR_INT,BEHAVIOUR_TYPE,ITS_BEHAVIOUR).

/*
 * THIRTEEN WAYS OF LOOKING AT A BLACKBIRD
 * Wallace Stevens
 *
 * I
 * Among twenty snowy mountains,
 * The only moving thing
```

```
 * Was the eye of the blackbird.
 *
 * II
 * I was of three minds,
 * Like a tree
 * In which there are three blackbirds
 *
 * III
 * The blackbird whirled in the autumn winds.
 * It was a small part of the pantomime.
 *
 * IV
 * A man and a woman are one.
 * A man and a woman and a
 * blackbird
 * Are one.
 *
 * V
 * I do not know which to prefer,
 * The beauty of inflections
 * Or the beauty of innuendoes,
 * The blackbird whistling
 * Or just after.
 *
 * VI
 * Icicles filled the long window
 * With barbaric glass.
 * The shadow of the blackbird
 * Crossed it, to and fro.
 * The mood
 * Traced in the shadow
 * An indecipherable cause.
 *
 * VII
 * O think men of Haddam,
 * Why do you imagine golden birds?
 * Do you not see how the blackbird
 * Walks around the feet
 * Of the women about you
 *
 * VIII
 * I know noble accents
 * And lucid, inescapable rhythms;
 * But I know, too,
 * That the blackbird is involved
 * In what I know.
 * ...
 *
 * (same conflicts and confusions present themselves in VII; the same
 * easy and unsatisfying answers (new beaks))
 *
 */

% One weighs a pile of feathers against an egg; measures wingspan in
% talons; looks for stripes and counts spots; compares speckling and
% distinguishes blackbirds' black hues. (Names leak, it is well known.
% That somehow systems of glimpses, observed differences in the
% sharpness of the V or ^ of the bird's wings, still aggregate and knot
% into holding language)

```

```
comparison_intensifier(NUM1,NUM2,INTS_STR):-
  integer(NUM1), integer(NUM2),
  DIFF = abs(NUM1 - NUM2),
  0 = DIFF,
  INTS_STR = " not".

comparison_intensifier(NUM1,NUM2,INTS_STR):-
  integer(NUM1), integer(NUM2),
  DIFF = abs(NUM1 - NUM2),
  0 < DIFF, DIFF =< 2,
  INTS_STR = " slightly".

comparison_intensifier(NUM1,NUM2,INTS_STR):-
  integer(NUM1), integer(NUM2),
  DIFF = abs(NUM1 - NUM2),
  2 < DIFF, DIFF =< 3,
  INTS_STR = " somewhat".

comparison_intensifier(NUM1,NUM2,INTS_STR):-
  integer(NUM1), integer(NUM2),
  DIFF = abs(NUM1 - NUM2),
  3 < DIFF, DIFF =< 4,
  INTS_STR = "".

comparison_intensifier(NUM1,NUM2,INTS_STR):-
  integer(NUM1), integer(NUM2),
  DIFF = abs(NUM1 - NUM2),
  4 < DIFF,
  INTS_STR = " much".

comparison_str(NUM1,NUM2,COMP_STR):-
  integer(NUM1), integer(NUM2),
  NUM1 > NUM2,
  comparison_intensifier(NUM1,NUM2,INTS_STR),
  strs_flatten([INTS_STR," larger than"],COMP_STR).

comparison_str(NUM1,NUM2,COMP_STR):-
  integer(NUM1), integer(NUM2),
  NUM1 < NUM2,
  comparison_intensifier(NUM1,NUM2,INTS_STR),
  strs_flatten([INTS_STR," smaller than"],COMP_STR).

comparison_str(NUM1,NUM2,COMP_STR):-
  integer(NUM1), integer(NUM2),
  NUM1 = NUM2,
  COMP_STR = " as large as".

compare_colors(FIRST_COLORS, SECOND_COLORS, IN_COMMON):-
  intersection(FIRST_COLORS, SECOND_COLORS, IN_COMMON).

% And now, a brief break for ode-singing -

bird_chirps(["ai","ou","ka","rik","chi","er","tee","oo",
       "wee","kraa","coo","kyik","ah","per","pip",
       "chip","klip","kok"]).

% Ode to a Nightingale
%    John Keats
%
% My heart aches, and a drowsy numbness pains
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%    My sense, as though of hemlock I had drunk,
% Or emptied some dull opiate to the drains
%    One minute past, and Lethe-wards had sunk:
% 'Tis not through envy of thy happy lot
%    But being too happy in thine happiness,-
%       That though, light-winged Dryad of the trees
%          In some melodious plot
% Of beechen green, and shadows numberless,
%    Singest of summer in full-throated ease.
%
% O, for a drought of vintage! that hath been
%    Cool'd a long age in the deep-delved earth,
% Tasting of Flora and the country green,
%    Dance, and Provencal song, and sunburnt mirth!
% O for a beaker full of the warm South,
%    Full of the true, the blushful Hippocrene,
%       With beaded bubbles winking at the brim,
%          And purple-stained mouth;
%    That I might drink, and leave the world unseen,
%       And with thee fade away into the forest dim:
%
% Fade far away, dissolve, and quite forget
%    What thou among the leaves hast never known,
% The weariness, the fever, and the fret
%    Here, where men sit and hear each other groan;
% Where palsy shakes a few, sad, last gray hairs,
%    Where youth grows pale, and spectre-thin, and dies;
%       Where but to think is to be full of sorrow
%          And leaden-eyed despairs,
% Where Beauty cannot keep her lustrous eyes,
%   Or new Love pine at them beyond to-morrow.
%
% Away! away! for I will fly to thee,
%    Not charioted by Bacchus and his pards,
% But on the viewless wings of Poesy,
%    Though the dull brain perlexes and retards:
% Already with thee! tender is the night,
%    And haply the Queen-Moon is on her throne,
%       Cluster'd around by all her starry Fays;
%          But here there is no light,
%    Save what from heaven is with the breezes blown
%       Through verdurous glooms and winding mossy ways
%
% I cannot see what flowers are at my feet,
%    Now what soft incense hangs upon the boughs,
% But, in embalmed darkness, guess each sweet
%    Wherewith the seasonable month endows
% The grass, the thicket, and the fruit-tree wild;
%    White hawthorn and the pastoral eglantine;
%       Fast fading violets cover'd up in leaves;
%          And mid-May's eldest child,
%    The coming musk-rose, full of dewy wine,
%       The murmurous haunt of flies on summer eves.
%
% Darkling I listen; and, for many a time
%    I have been half in love with easeful Death,
% Call'd him soft names in many a mused rhyme,
%    To take into the air my quiet breath;
%       Now more then ever seems it rich to die,
%    To cease upon the midnight with no pain,
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%       While thou art pouring forth thy soul abroad
%          In such an ecstasy!
%    Still wouldst thou sing, and I have ears in vain-
%       To thy high requiem become a sod.
%
% Thou wast not born for death, immortal Bird!
%    No hungry generations thread thee down;
% The voice I hear this passing night was heard
%    In ancient days by emperor and clown:
% Perhaps the self-same song that found a path
%    Through the sad heart of Ruth, when, sick for home,
%       She stood in tears amid the alien corn;
%          The same that oft-times hath at intervels.
%
%
%    Charm'd magic casements, opening on the foam
%       Of perilous seas in faery lands forlorn.
%
% Forlorn! the very word is like a bell
%    To toll me back from thee to my sole self!
% Adieu! the fancy cannot cheat so well
%    As she is fam'd to do, deceiving elf.
% Adieu! adieu! thy plaintive anthem fades
%    Past the near meadows, over the still stream,
%       Up the hill-side; and now 'tis buried deep
%          In the next valley-glades:
%    Was it a vision, or a waking dream?
%       Fled is that music:-Do I wake or sleep?

word --> [chirp].

tweet --> [first_chirp], word.
tweet --> [first_chirp], word, word.

melody --> tweet.
melody --> [shriek], tweet.

structure --> [echo_shriek].
structure --> [but_with_a_chirp].
structure --> [].
structure --> [chirp_echo].

song --> melody, structure.
song --> melody, [pause], song.

% The sound of beak on wood,
% clear air, the sun-hot dirt;
% quick clicks frantic as footsteps.
%
% Elsewhere a chirping,
% as microwaves or cellphones do.

makeSomeSound(THE_SOUND):-
  bird_chirps(ALL_POSSIBLE_SOUNDS),
  random_member(THE_SOUND,ALL_POSSIBLE_SOUNDS).

parse_song([],SUNG_SONG,SUNG_SONG).
parse_song([first_chirp|REST_OF_SONG],SUNG_SO_FAR,WHOLE_SUNG_SONG):-
  makeSomeSound(THE_SOUND),
  strs_flatten([SUNG_SO_FAR,THE_SOUND],MORE_SUNG),
```

```
  parse_song(REST_OF_SONG,MORE_SUNG,WHOLE_SUNG_SONG).
parse_song([chirp|REST_OF_SONG],SUNG_SO_FAR,WHOLE_SUNG_SONG):-
  makeSomeSound(THE_SOUND),
  strs_flatten([SUNG_SO_FAR,"-",THE_SOUND],MORE_SUNG),
  parse_song(REST_OF_SONG,MORE_SUNG,WHOLE_SUNG_SONG).
parse_song([pause|REST_OF_SONG],SUNG_SO_FAR,WHOLE_SUNG_SONG):-
  strs_flatten([SUNG_SO_FAR," "],SUNG_PAUSED),
  parse_song(REST_OF_SONG,SUNG_PAUSED,WHOLE_SUNG_SONG).
parse_song([shriek|REST_OF_SONG],SUNG_SO_FAR,WHOLE_SUNG_SONG):-
  makeSomeSound(THE_SOUND),
  string_upper(THE_SOUND,LOUD_SOUND),
  strs_flatten([SUNG_SO_FAR,LOUD_SOUND],MORE_SUNG),
  parse_song(REST_OF_SONG,MORE_SUNG,WHOLE_SUNG_SONG).

parse_song([echo_shriek],SUNG,WHOLE_SONG):-
  makeSomeSound(THE_SOUND),
  string_upper(THE_SOUND,LOUD_SOUND),
  strs_flatten([SUNG," ",SUNG,LOUD_SOUND],WHOLE_SONG).
parse_song([but_with_a_chirp],SUNG,WHOLE_SONG):-
  makeSomeSound(THE_SOUND),
  strs_flatten([SUNG," ",THE_SOUND],WHOLE_SONG).
parse_song([chirp_echo],SUNG,WHOLE_SONG):-
  makeSomeSound(THE_SOUND),
  strs_flatten([SUNG," ",THE_SOUND," ",SUNG],WHOLE_SONG).

song_sung(SONG,SUNG):-
  parse_song(SONG,"",SUNG).

% Some of the things birds are typically about are freedom or grace, but
% also the cackle of their crowd or the ugly grub in their mouth. One of
% the things i wonder about then, about them, is about the distinction
% between squawk and song, and who makes it and who hears it.
%
% The hope is to stand in hot pollen-laden air as the sharp sections
% of pitch thrown about follow and reiterate each other into music or
% commotion.
%
% (So sing thing, sing)
% (Or squawk flock squawk, i suppose, at your
% discretion and preference)

nth_song(0,[]).

nth_song(N,NTH_SONG):-
  findnsols(N,THIS_SONG,song(THIS_SONG,[]),THE_SONGS),
  NMONE is N - 1,
  nth0(NMONE,THE_SONGS,NTH_CHIRPS),
  song_sung(NTH_CHIRPS,NTH_SONG).

bird_birdSong(LISTED_BIRD,THE_SONG):-
  birdList_birdIndex(LISTED_BIRD,THE_NUMBER),
  nth_song(THE_NUMBER,THE_SONG).

% When they stop writing about love and death, they find that they are
% walking in a forest; I can't tell you who they are or hear what they
% are saying, but I can tell you about the leaves on the branches and
% the loam and orange light. Around them there are: 2 woodpeckers. 1
% swallow. A vulture overhead and a swift in a bush.

part_phrase(PART,LIST_THE_BIRD,TALK_ABOUT_THAT):-
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1197   birdList_birdColors(LIST_THE_BIRD,ALL_THE_BIRD),
1198   member([PART,ITS_COLOR], ALL_THE_BIRD),
1199   strs_flatten([ITS_COLOR," ",PART],TALK_ABOUT_THAT).
1200
1201 describe_that_part([PART,ITS_COLOR],THAT_PART_DESCRIBED):-
1202   strs_flatten([" a ",ITS_COLOR, " ", PART],THAT_PART_DESCRIBED).
1203
1204 describe_parts([],"").
1205
1206 describe_parts([A_PART],DESCRIBE_IT):-
1207   describe_that_part(A_PART,DESCRIBE_IT).
1208
1209 describe_parts([A_PART | OTHER_PARTS],DESCRIBE_THEM):-
1210   length(OTHER_PARTS,NUM_OTHER_PARTS),
1211   NUM_OTHER_PARTS > 0,
1212   describe_that_part(A_PART,DESCRIBE_FIRST),
1213   describe_parts(OTHER_PARTS,DESCRIBE_REST),
1214   strs_flatten([DESCRIBE_FIRST," and", DESCRIBE_REST], DESCRIBE_THEM).
1215
1216 % In the Splash Zone of the Monterey Bay Aquarium, the only exhibit to
1217 % feature international fish (as children require their foreign color
1218 % and striping), on the way to their room of penguins given both water
1219 % and a rocky plaster beach sans ice floe, there is a maze of coral and
1220 % anemonoes, where you, the child, may redirect the flow and crash of
1221 % the waves by placing blocks; all this all is is a bunch of switches,
1222 % but the question, i think, is, how we can we make, or make a better,
1223 % blackbird with them? How can we make the bird exuberant or melancholy?
1224 % How can we direct the next wave to splash our cousin's face?
1225
1226 numIdSentTypes(6).
1227
1228 typically_synonym(TYPICALLY_SYNONYM):-
1229   random_member(TYPICALLY_SYNONYM,["typically","usually","generally",
1230             "most often"]).
1231 identified_synonym(IDENTIFIED_SYNONYM):-
1232   random_member(IDENTIFIED_SYNONYM,["identified","distinguished","told
     apart"]).
1233 notable_synonym(NOTABLE_SYNONYM):-
1234   random_member(NOTABLE_SYNONYM,["notable","conspicuous","remarkable"]).
1235
1236 identificatoryInfo_sentence(PART1_FEATURE, PART1, PART2_FEATURE, PART2,
     ID_SENT):-
1237   numIdSentTypes(NUM_SENT_TYPES),
1238   random_between(1,NUM_SENT_TYPES,SENT_TYPE),
1239   identificatoryInfo_sentence(SENT_TYPE,PART1_FEATURE, PART1, PART2_FEATURE,
1240              PART2, ID_SENT).
1241
1242 identificatoryInfo_sentence(1,PART1_FEATURE, PART1, PART2_FEATURE, PART2,
     ID_SENT):-
1243   identified_synonym(IDENTIFIED),
1244   strs_flatten(["One can be ",IDENTIFIED," by its ", PART1_FEATURE," ",
     PART1,
1245            " and its' ", PART2_FEATURE," ",PART2,". "],ID_SENT).
1246
1247 identificatoryInfo_sentence(2,PART1_FEATURE, PART1, _, _, ID_SENT):-
1248   notable_synonym(NOTABLE),
1249   strs_flatten(["Their ", PART1_FEATURE," ", PART1, "s are ",NOTABLE,".
     "],ID_SENT).
1250
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```
1251 identificatoryInfo_sentence(3,PART1_FEATURE, PART1, PART2_FEATURE, PART2,
     ID_SENT):-
1252   strs_flatten(["They have ", PART1_FEATURE," ", PART1, "s and ",
1253           PART2_FEATURE," ",PART2,"s. "],ID_SENT).
1254
1255 identificatoryInfo_sentence(4,PART1_FEATURE, PART1, _, PART2, ID_SENT):-
1256   typically_synonym(TYPICALLY),
1257   identified_synonym(IDENTIFIED),
1258   strs_flatten(["They can ",TYPICALLY," be ",IDENTIFIED," by their ",
1259           PART1_FEATURE," ", PART1,"s and ",PART2,"s. "],ID_SENT).
1260
1261 identificatoryInfo_sentence(5,PART1_FEATURE, PART1, _, _, ID_SENT):-
1262   typically_synonym(TYPICALLY),
1263   notable_synonym(NOTABLE),
1264   strs_flatten(["Its' ",NOTABLE," ",PART1_FEATURE," ", PART1, " ",
1265           TYPICALLY," lets you identify one. "],ID_SENT).
1266
1267 identificatoryInfo_sentence(6,PART1_FEATURE, PART1, PART2_FEATURE, PART2,
     ID_SENT):-
1268   typically_synonym(TYPICALLY_LOWER),
1269   capitalize_first(TYPICALLY_LOWER,TYPICALLY),
1270   notable_synonym(NOTABLE),
1271   identified_synonym(IDENTIFIED),
1272   strs_flatten([TYPICALLY,", one can be ",IDENTIFIED," by its
     ",PART1_FEATURE,
1273           " ", PART1, " and its' ",NOTABLE," ",PART2_FEATURE," ",PART2,".
     "],
1274          ID_SENT).
1275
1276 identificatory_sentence(_,ID_SENT):-
1277   birdParts(B_PARTS),
1278   random_member(PART1,B_PARTS),
1279   delete(B_PARTS,PART1,OTHER_B_PARTS),
1280   random_member(PART2,OTHER_B_PARTS),
1281   a_partFeature(PART1_FEATURE),
1282   a_partFeature(PART2_FEATURE),
1283   identificatoryInfo_sentence(PART1_FEATURE, PART1, PART2_FEATURE, PART2,
     ID_SENT).
1284
1285 % There are estimated to be 19,000,000 mallards to 50 crested
1286 % shellducks. Between 350 and 1500 scarlet banded barbets on the summit
1287 % of a solitary Peruvian mountain to between 73.5 million and 216
1288 % million great spotted woodpeckers, over 40,000,000 willow ptarmigans
1289 % and 1679 flightless cormorants. Some billions, maybe hundreds of
1290 % billions, overall. Someone sits on the rocky beach in rain-pants
1291 % twisting bands round wet-feathered legs.
1292
1293 rarity_advRarity("common","often").
1294 rarity_advRarity("uncommon","sometimes").
1295 rarity_advRarity("rare","occasionally").
1296 rarity_advRarity("extinct","never").
1297
1298
1299 clime_somePlace(THE_CLIME,THE_PLACE):-
1300   clime_climePlaces(THE_CLIME,POSSIBLE_PLACES),
1301   random_member(THE_PLACE,POSSIBLE_PLACES).
1302
1303 clime_someOtherPlace(THE_CLIME,THAT_PLACE,ANOTHER_PLACE):-
1304   clime_climePlaces(THE_CLIME,POSSIBLE_PLACES),
1305   delete(POSSIBLE_PLACES,THAT_PLACE,REMAINING_PLACES),
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```
1306   random_member(ANOTHER_PLACE,REMAINING_PLACES).
1307
1308 distributionAndDiet_sentence(LISTED_BIRD,DIST_SENT):-
1309   birdList_birdName(LISTED_BIRD,NAME_FOR_EM),
1310   birdList_birdRarity(LISTED_BIRD,[HOW_MANY]),
1311   birdList_birdDir(LISTED_BIRD,POINT_WHERE),
1312   birdList_birdClime(LISTED_BIRD,[WHAT_WEATHER]),
1313   birdList_birdFamily(LISTED_BIRD,[ITS_RELATIONS]),
1314   birdFamily_diet(ITS_RELATIONS,DIET),
1315   clime_somePlace(WHAT_WEATHER,WHERE),
1316   clime_someOtherPlace(WHAT_WEATHER,WHERE,WHERE_ELSE),
1317   diet_habitat_foodSource(DIET,WHERE,FOOD),
1318   rarity_advRarity(HOW_MANY,HOW_MANYLY),
1319   desc_name(cardDir,POINT_WHERE,WHERE_POINTED),
1320   distributionDietInfo_sentence(NAME_FOR_EM,HOW_MANYLY,WHERE_POINTED,WHERE,
1321               WHERE_ELSE,FOOD,DIST_SENT_ALMOST),
1322   capitalize_first(DIST_SENT_ALMOST,DIST_SENT).
1323
1324 numDistSentTypes(7).
1325
1326 residein_synonym(RESIDEIN_SYNONYM):-
1327   random_member(RESIDEIN_SYNONYM,["reside in","live
     in","occupy","inhabit"]).
1328 spotted_synonym(SPOTTED_SYNONYM):-
1329   random_member(SPOTTED_SYNONYM,
     ["spotted","found","seen","observed","found"]).
1330 feedingon_synonym(FEEDINGON_SYNONYM):-
1331   random_member(FEEDINGON_SYNONYM,["feeding on","eating","consuming"]).
1332
1333 distributionDietInfo_sentence(THEM_NAMED,HOW_MANYLY,WHERE_POINTED,WHERE,WHER
     E_ELSE,
1334             FOOD,DIST_SENT):-
1335   numDistSentTypes(NUM_SENT_TYPES),
1336   random_between(1,NUM_SENT_TYPES,SENT_TYPE),
1337
     distributionDietInfo_sentence(SENT_TYPE,THEM_NAMED,HOW_MANYLY,WHERE_POINTED,
1338               WHERE,WHERE_ELSE,FOOD,DIST_SENT).
1339
1340 distributionDietInfo_sentence(1,THEM_NAMED,HOW_MANYLY,WHERE_POINTED,WHERE,WH
     ERE_ELSE,
1341             FOOD,DIST_SENT):-
1342   typically_synonym(TYPICALLY),
1343   residein_synonym(RESIDEIN),
1344   strs_flatten([THEM_NAMED,"s ",HOW_MANYLY," ",RESIDEIN," ",WHERE_POINTED,"
     ",
1345           WHERE_ELSE," or ",WHERE," where they ",TYPICALLY,
1346           " subsist on ",FOOD,". "],DIST_SENT).
1347
1348 distributionDietInfo_sentence(2,THEM_NAMED,HOW_MANYLY,WHERE_POINTED,WHERE,
1349             WHERE_ELSE,_,DIST_SENT):-
1350   spotted_synonym(SPOTTED),
1351   strs_flatten([THEM_NAMED,"s can ",HOW_MANYLY," be ",SPOTTED," around ",
1352           WHERE_POINTED," ",WHERE," or at times in ",WHERE_POINTED,
1353           " ",WHERE_ELSE,". "],DIST_SENT).
1354
1355 distributionDietInfo_sentence(3,THEM_NAMED,HOW_MANYLY,WHERE_POINTED,WHERE,_,
     FOOD,
1356             DIST_SENT):-
1357   spotted_synonym(SPOTTED),
1358   feedingon_synonym(FEEDINGON),
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1359   strs_flatten(["You are most likely to discover ",THEM_NAMED,"s in ",
1360           WHERE_POINTED," ",WHERE,". There, they can ",HOW_MANYLY," be ",
1361           SPOTTED," ",FEEDINGON," ",FOOD,". "],DIST_SENT).
1362
1363 distributionDietInfo_sentence(4,THEM_NAMED,HOW_MANYLY,WHERE_POINTED,WHERE,_,
     FOOD,DIST_SENT):-
1364   spotted_synonym(SPOTTED),
1365   strs_flatten([THEM_NAMED,"s may ",HOW_MANYLY," be ",SPOTTED," in
     ",WHERE_POINTED," ",
1366           WHERE," searching for ",FOOD,". "],DIST_SENT).
1367
1368 distributionDietInfo_sentence(5,THEM_NAMED,_,WHERE_POINTED,WHERE,_,FOOD,DIST
     _SENT):-
1369   strs_flatten([THEM_NAMED,"s feed on ",FOOD," in ",WHERE_POINTED,"
     ",WHERE,". "],
1370          DIST_SENT).
1371
1372 distributionDietInfo_sentence(6,THEM_NAMED,HOW_MANYLY,WHERE_POINTED,WHERE,WH
     ERE_ELSE,
1373              FOOD,DIST_SENT):-
1374   spotted_synonym(SPOTTED),
1375   strs_flatten([THEM_NAMED,"s may ",HOW_MANYLY," be ",SPOTTED," in
     ",WHERE_POINTED, " ",
1376           WHERE_ELSE," or in ",WHERE,". Their diet consists primarily of
     ",FOOD,". "],
1377          DIST_SENT).
1378
1379 distributionDietInfo_sentence(7,THEM_NAMED,HOW_MANYLY,WHERE_POINTED,WHERE,WH
     ERE_ELSE,
1380              FOOD,DIST_SENT):-
1381   spotted_synonym(SPOTTED),
1382   strs_flatten([THEM_NAMED,"s can ",HOW_MANYLY," be ",SPOTTED," eating
     ",FOOD," in ",
1383           WHERE_POINTED," ",WHERE,", or now and then in ",WHERE_ELSE,". "],
1384          DIST_SENT).
1385
1386 comparative_phrase(LIST_BIRD1,LIST_BIRD2,COMP_PHR):-
1387   birdList_birdSize(LIST_BIRD1,B1_SIZE),
1388   birdList_birdSize(LIST_BIRD2,B2_SIZE),
1389   comparison_str(B1_SIZE,B2_SIZE,COMP_STR),
1390   strs_flatten([" is", COMP_STR],COMP_PHR).
1391
1392 numCompSentTypes(6).
1393
1394 comparativeInfo_sentence(B1_NAME,B2_NAME,COMP_PHR,DESC1,DESC2,COMP_SENT):-
1395   numCompSentTypes(NUM_SENT_TYPES),
1396   random_between(1,NUM_SENT_TYPES,SENT_TYPE),
1397
     comparativeInfo_sentence(SENT_TYPE,B1_NAME,B2_NAME,COMP_PHR,DESC1,DESC2,COMP
     _SENT).
1398
1399 with_synonym(WITH_SYNONYM):-
1400   random_member(WITH_SYNONYM,["with","and has","possessing"]).
1401 mistakenfor_synonym(MISTAKENFOR_SYNONYM):-
1402   random_member(MISTAKENFOR_SYNONYM,["mistaken for","confused with",
1403              "incorrectly identified as"]).
1404
1405 comparativeInfo_sentence(1,B1_NAME,B2_NAME,COMP_PHR,DESC1,DESC2,COMP_SENT):-
1406   with_synonym(WITH),
1407   strs_flatten(["The ",B1_NAME,COMP_PHR," the ",B2_NAME,", ",WITH," a ",
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1408          DESC1," and ",DESC2,". "],COMP_SENT).
1409 comparativeInfo_sentence(2,B1_NAME,B2_NAME,COMP_PHR,DESC1,DESC2,COMP_SENT):-
1410   with_synonym(WITH),
1411   strs_flatten(["The ",B1_NAME, " resembles the ",B2_NAME," but",COMP_PHR,
1412          " it, ",WITH," a ",DESC1," and ",DESC2,". "],COMP_SENT).
1413 comparativeInfo_sentence(3,B1_NAME,B2_NAME,COMP_PHR,DESC1,_,COMP_SENT):-
1414   strs_flatten(["With a ",DESC1,", the ",B1_NAME,COMP_PHR,
1415          " the ",B2_NAME,". "],COMP_SENT).
1416
1417 comparativeInfo_sentence(4,B1_NAME,B2_NAME,COMP_PHR,DESC1,DESC2,COMP_SENT):-
1418   strs_flatten(["The ",B1_NAME,COMP_PHR," the ",B2_NAME," and is notable for
      its ",
1419          DESC1," and ",DESC2,". "],COMP_SENT).
1420
1421 comparativeInfo_sentence(5,B1_NAME,B2_NAME,COMP_PHR,DESC1,DESC2,COMP_SENT):-
1422   with_synonym(WITH),
1423   strs_flatten(["A relative of the ", B2_NAME, ", the ", B1_NAME, COMP_PHR,
1424          " it, ",WITH," a ",DESC1," and ",DESC2,". "],COMP_SENT).
1425 comparativeInfo_sentence(6,B1_NAME,B2_NAME,COMP_PHR,DESC1,DESC2,COMP_SENT):-
1426   mistakenfor_synonym(MISTAKENFOR),
1427   strs_flatten(["The ", B1_NAME," is sometimes ",MISTAKENFOR," the ",
      B2_NAME,
1428          " and", COMP_PHR, " it. The  ",B1_NAME," has a ",DESC1," and
      ",DESC2,". "],COMP_SENT).
1429
1430 comparative_sentence(LIST_BIRD1,LIST_BIRD2,COMP_SENT):-
1431   birdList_birdName(LIST_BIRD1,B1_NAME),
1432   birdList_birdName(LIST_BIRD2,B2_NAME),
1433   birdParts(B_PARTS),
1434   random_member(PART1,B_PARTS),
1435   delete(B_PARTS,PART1,OTHER_B_PARTS),
1436   random_member(PART2,OTHER_B_PARTS),
1437   part_phrase(PART1,LIST_BIRD1,DESC1),
1438   part_phrase(PART2,LIST_BIRD1,DESC2),
1439   comparative_phrase(LIST_BIRD1,LIST_BIRD2,COMP_PHR),
1440   comparativeInfo_sentence(B1_NAME,B2_NAME,COMP_PHR,DESC1,DESC2,COMP_SENT).
1441
1442 numDescSentTypes(6).
1443
1444 descriptiveInfo_sentence(BIRD_NAME,BFAMILY,DESC1,DESC2,DESC_SENT):-
1445   numDescSentTypes(NUM_SENT_TYPES),
1446   random_between(1,NUM_SENT_TYPES,SENT_TYPE),
1447
      descriptiveInfo_sentence(SENT_TYPE,BIRD_NAME,BFAMILY,DESC1,DESC2,DESC_SENT).
1448
1449 descriptiveInfo_sentence(1,BIRD_NAME,_,DESC1,DESC2,DESC_SENT):-
1450   strs_flatten(["The ",BIRD_NAME," has a ",DESC1," and a ",DESC2,".
      "],DESC_SENT).
1451
1452 descriptiveInfo_sentence(2,BIRD_NAME,_,DESC1,DESC2,DESC_SENT):-
1453   notable_synonym(NOTABLE),
1454   strs_flatten(["The ",BIRD_NAME," is ",NOTABLE," for its ",DESC1," and its
      ",
1455          DESC2,". "],DESC_SENT).
1456
1457 descriptiveInfo_sentence(3,BIRD_NAME,[ITS_FAMILY],DESC1,_,DESC_SENT):-
1458   strs_flatten(["A ",ITS_FAMILY," with a ",DESC1," is the ",BIRD_NAME,". "],
1459         DESC_SENT).
1460
1461 descriptiveInfo_sentence(4,BIRD_NAME,[ITS_FAMILY],DESC1,DESC2,DESC_SENT):-
```

```
1462   strs_flatten(["The ",BIRD_NAME," is a ",ITS_FAMILY, " with a ", DESC1,
1463           " and a ", DESC2,". "],DESC_SENT).
1464
1465 descriptiveInfo_sentence(5,BIRD_NAME,[ITS_FAMILY],DESC1,DESC2,DESC_SENT):-
1466   notable_synonym(NOTABLE),
1467   strs_flatten(["One kind of ",ITS_FAMILY," is the ",BIRD_NAME, ", a bird ",
1468           NOTABLE," for its ", DESC1, " and ", DESC2,". "],DESC_SENT).
1469
1470 descriptiveInfo_sentence(6,BIRD_NAME,_,DESC1,DESC2,DESC_SENT):-
1471   strs_flatten(["A bird with a ", DESC1, " and a ", DESC2," is the ",
1472           BIRD_NAME,". "],DESC_SENT).
1473
1474 descriptive_sentence(LISTED_BIRD,DESC_SENT):-
1475   birdList_birdName(LISTED_BIRD,BIRD_NAME),
1476   birdParts(B_PARTS),
1477   birdList_birdFamily(LISTED_BIRD,BFAMILY),
1478   random_member(PART1,B_PARTS),
1479   delete(B_PARTS,PART1,OTHER_B_PARTS),
1480   random_member(PART2,OTHER_B_PARTS),
1481   part_phrase(PART1,LISTED_BIRD,DESC1),
1482   part_phrase(PART2,LISTED_BIRD,DESC2),
1483   descriptiveInfo_sentence(BIRD_NAME,BFAMILY,DESC1,DESC2,DESC_SENT).
1484
1485 numBehSentTypes(6).
1486
1487 behaviour_sentence(LISTED_BIRD,BEH_SENT):-
1488   birdList_birdName(LISTED_BIRD,BIRD_NAME),
1489   bird_behaviour(BIRD_NAME,BEHAVIOUR),
1490   bird_sociability(BIRD_NAME,EXTRAVERSION),
1491   behaviourInfo_sentence(EXTRAVERSION,BEHAVIOUR,BEH_SENT).
1492
1493 behaviourInfo_sentence(EXTRAVERSION,BEHAVIOUR,BEH_SENT):-
1494   numBehSentTypes(NUM_SENT_TYPES),
1495   random_between(1,NUM_SENT_TYPES,SENT_TYPE),
1496   behaviourInfo_sentence(SENT_TYPE,EXTRAVERSION,BEHAVIOUR,BEH_SENT).
1497
1498 behaviourInfo_sentence(1,EXTRAVERSION,BEHAVIOUR,BEH_SENT):-
1499   sociability_descriptor(EXTRAVERSION,SOC_DESC),
1500   capitalize_first(SOC_DESC,CAP_SOC_DESC),
1501   strs_flatten([CAP_SOC_DESC,", they ",BEHAVIOUR,". "],BEH_SENT).
1502
1503 behaviourInfo_sentence(2,EXTRAVERSION,BEHAVIOUR,BEH_SENT):-
1504   sociability_descriptor(EXTRAVERSION,SOC_DESC),
1505   strs_flatten(["A bird living ",SOC_DESC,", they ",BEHAVIOUR,".
   "],BEH_SENT).
1506
1507 behaviourInfo_sentence(3,EXTRAVERSION,BEHAVIOUR,BEH_SENT):-
1508   sociability_descriptor(EXTRAVERSION,SOC_DESC),
1509   strs_flatten(["These birds ",BEHAVIOUR,", ",SOC_DESC,". "],BEH_SENT).
1510
1511
1512 behaviourInfo_sentence(4,EXTRAVERSION,BEHAVIOUR,BEH_SENT):-
1513   strs_flatten(["These ",EXTRAVERSION," birds ",BEHAVIOUR,". "],BEH_SENT).
1514
1515 behaviourInfo_sentence(5,_,BEHAVIOUR,BEH_SENT):-
1516   strs_flatten(["They ",BEHAVIOUR,". "],BEH_SENT).
1517
1518 behaviourInfo_sentence(6,EXTRAVERSION,_,BEH_SENT):-
1519   sociability_descriptor(EXTRAVERSION,SOC_DESC),
1520   strs_flatten(["These birds live ",SOC_DESC,". "],BEH_SENT).
```

```
1521
1522 numComCSentTypes(1).
1523
1524 commonColor_sentence(FIRST_BIRD,SECOND_BIRD,BEH_SENT):-
1525   birdList_birdColors(FIRST_BIRD,FIRST_COLORS),
1526   birdList_birdColors(SECOND_BIRD,SECOND_COLORS),
1527   compare_colors(FIRST_COLORS,SECOND_COLORS,COMMON_PARTS),
1528   describe_parts(COMMON_PARTS,IN_COMMON),
1529   commonColorInfo_sentence(IN_COMMON,BEH_SENT).
1530
1531 commonColorInfo_sentence(IN_COMMON,BEH_SENT):-
1532   numComCSentTypes(NUM_SENT_TYPES),
1533   random_between(1,NUM_SENT_TYPES,SENT_TYPE),
1534   commonColorInfo_sentence(SENT_TYPE,IN_COMMON,BEH_SENT).
1535
1536 commonColorInfo_sentence(1,"",COMMONC_SENT):-
1537   strs_flatten(["Their colors are completely different. "],COMMONC_SENT).
1538
1539 commonColorInfo_sentence(1,IN_COMMON,COMMONC_SENT):-
1540   string_length(IN_COMMON,AMOUNT_IN_COMMON),
1541   AMOUNT_IN_COMMON > 0,
1542   strs_flatten(["Both birds have ",IN_COMMON,". "],COMMONC_SENT).
1543
1544 % 8 COUNT
1545 % Charles Bukowski
1546 %
1547 % from my bed
1548 % I watch
1549 % 3 birds
1550 % on a telephone
1551 % wire.
1552 %
1553 % one flies
1554 % off.
1555 % then
1556 % another.
1557 %
1558 % one is left,
1559 % then
1560 % it too
1561 % is gone
1562 %
1563 % my typewriter is
1564 % tombstone still.
1565 %
1566 % and I am
1567 % reduced to bird
1568 % watching.
1569 %
1570 % just thought I'd
1571 % let you
1572 % know,
1573 % fucker.
1574
1575 a_style(SOME_STYLE):- random_member(SOME_STYLE,
     ["low","high","tuneful","abrasive",
1576              "melodic","hoarse"]).
1577
1578 song_sentence(LISTED_BIRD,SONG_SENT):-
1579   bird_birdSong(LISTED_BIRD,THE_SONG),
```

```
1580   birdList_birdSinging(LISTED_BIRD,[THE_WAY_OF_SINGING]),
1581   a_style(FIRST_STYLE),
1582   a_style(SECOND_STYLE),
1583
     songInfo_sentence(THE_WAY_OF_SINGING,FIRST_STYLE,SECOND_STYLE,THE_SONG,SONG_
     SENT).
1584
1585 numSongSentTypes(6).
1586
1587 sortof_synonym(SORT_OF_SYNONYM):- random_member(SORT_OF_SYNONYM,
1588             ["sort of","kind of","type of"]).
1589 soundslike_synonym(SOUNDS_LIKE_SYNONYM):- random_member(SOUNDS_LIKE_SYNONYM,
1590               ["sounds like","resembles",
1591                "might be transcribed"]).
1592
1593 songInfo_sentence(THE_WAY_OF_SINGING,FIRST_STYLE,SECOND_STYLE,THE_SONG,SONG_
     SENT):-
1594   numSongSentTypes(NUM_SENT_TYPES),
1595   random_between(1,NUM_SENT_TYPES,SENT_TYPE),
1596   songInfo_sentence(SENT_TYPE,THE_WAY_OF_SINGING,FIRST_STYLE,SECOND_STYLE,
1597         THE_SONG,SONG_SENT).
1598
1599 songInfo_sentence(1,_,_,_,THE_SONG,SONG_SENT):-
1600   sortof_synonym(SORTOF),
1601   strs_flatten(["CALL: a ",SORTOF," \"",THE_SONG,"\". "],SONG_SENT).
1602
1603 songInfo_sentence(2,_,FIRST_STYLE,_,THE_SONG,SONG_SENT):-
1604   strs_flatten(["CALL: a ",FIRST_STYLE," \"",THE_SONG,"\". "],SONG_SENT).
1605
1606 songInfo_sentence(3,WAY_OF_SINGING,FIRST_STYLE,_,THE_SONG,SONG_SENT):-
1607   soundslike_synonym(SOUNDSLIKE),
1608   strs_flatten(["CALL: a ",FIRST_STYLE," ",WAY_OF_SINGING," which
     ",SOUNDSLIKE,
1609            " \"",THE_SONG,"\". "],SONG_SENT).
1610
1611 songInfo_sentence(4,WAY_OF_SINGING,FIRST_STYLE,SECOND_STYLE,THE_SONG,SONG_SE
     NT):-
1612   soundslike_synonym(SOUNDSLIKE),
1613   strs_flatten(["CALL: a ",WAY_OF_SINGING," that starts ",FIRST_STYLE," and
     ends ",
1614            SECOND_STYLE,", which ",SOUNDSLIKE," \"",THE_SONG,"\".
     "],SONG_SENT).
1615
1616 songInfo_sentence(5,WAY_OF_SINGING,FIRST_STYLE,SECOND_STYLE,THE_SONG,SONG_SE
     NT):-
1617   sortof_synonym(SORTOF),
1618   strs_flatten(["CALL: a ",SORTOF," ",WAY_OF_SINGING," - first
     ",FIRST_STYLE," then ",
1619            SECOND_STYLE," \"",THE_SONG,"\". "],SONG_SENT).
1620
1621 songInfo_sentence(6,_,_,_,THE_SONG,SONG_SENT):-
1622   strs_flatten(["CALL: a \"",THE_SONG,"\". "],SONG_SENT).
1623
1624
1625 /*
1626  * THIRTEEN WAYS OF LOOKING AT A BLACKBIRD
1627  * Wallace Stevens
1628  *
1629  * I
1630  * Among twenty snowy mountains,
```

```
1631 * The only moving thing
1632 * Was the eye of the blackbird.
1633 *
1634 * II
1635 * I was of three minds,
1636 * Like a tree
1637 * In which there are three blackbirds
1638 *
1639 * III
1640 * The blackbird whirled in the autumn winds.
1641 * It was a small part of the pantomime.
1642 *
1643 * IV
1644 * A man and a woman
1645 * Are one.
1646 * A man and a woman and a blackbird
1647 * Are one.
1648 *
1649 * V
1650 * I do not know which to prefer,
1651 * The beauty of inflections
1652 * Or the beauty of innuendoes,
1653 * The blackbird whistling
1654 * Or just after.
1655 *
1656 * VI
1657 * Icicles filled the long window
1658 * With barbaric glass.
1659 * The shadow of the blackbird
1660 * Crossed it, to and fro.
1661 * The mood
1662 * Traced in the shadow
1663 * An indecipherable cause.
1664 *
1665 * VII
1666 * O think men of Haddam,
1667 * Why do you imagine golden birds?
1668 * Do you not see how the blackbird
1669 * Walks around the feet
1670 * Of the women about you
1671 *
1672 * VIII
1673 * I know noble accents
1674 * And lucid, inescapable rhythms;
1675 * But I know, too,
1676 * That the blackbird is involved
1677 * In what I know.
1678 *
1679 * IX
1680 * When the blackbird flew out of sight,
1681 * It marked the edge
1682 * Of one of many circles.
1683 *
1684 * X
1685 * At the sight of blackbirds
1686 * Flying in green light,
1687 * Even the bawds of euphony
1688 * Would cry out sharply.
1689 *
1690 * XI
```

```
 * He rode over Connecticut
 * In a glass coach.
 * Once, a fear pierced him,
 * In that he mistook
 * The shadow of his equipage
 * For blackbirds.
 *
 * XII
 * The river is moving.
 * The blackbird must be flying.
 *
 * XIII
 * It was evening all afternoon.
 * It was snowing
 * And it was going to snow.
 * The blackbird sat
 * In the cedar-limbs.
 */

% Some birds names are people's names. But to invent the names of birds
% named after people would require inventing people, and that is beyond
% the scope of this particular project.

ofBirds_ofTypes_text(_,_,[],"").
ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,[comparative|OTHER_TYPES],THE_TEXT):-
  comparative_sentence(LIST_BIRD1,LIST_BIRD2,COMP_SENT),
  ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,OTHER_TYPES,REMAINING_TEXT),
  string_concat(COMP_SENT,REMAINING_TEXT,THE_TEXT).
ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,[common_colors|OTHER_TYPES],THE_TEXT):-
  commonColor_sentence(LIST_BIRD1,LIST_BIRD2,COMC_SENT),
  ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,OTHER_TYPES,REMAINING_TEXT),
  string_concat(COMC_SENT,REMAINING_TEXT,THE_TEXT).
ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,[identificatory|OTHER_TYPES],THE_TEXT):-
  identificatory_sentence(LIST_BIRD1,ID_SENT),
  ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,OTHER_TYPES,REMAINING_TEXT),
  string_concat(ID_SENT,REMAINING_TEXT,THE_TEXT).
ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,[distribution|OTHER_TYPES],THE_TEXT):-
  distributionAndDiet_sentence(LIST_BIRD1,DIST_SENT),
  ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,OTHER_TYPES,REMAINING_TEXT),
  string_concat(DIST_SENT,REMAINING_TEXT,THE_TEXT).
ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,[descriptive|OTHER_TYPES],THE_TEXT):-
  descriptive_sentence(LIST_BIRD1,DESC_SENT),
  ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,OTHER_TYPES,REMAINING_TEXT),
  string_concat(DESC_SENT,REMAINING_TEXT,THE_TEXT).
ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,[behaviour|OTHER_TYPES],THE_TEXT):-
  behaviour_sentence(LIST_BIRD1,BEH_SENT),
  ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,OTHER_TYPES,REMAINING_TEXT),
  string_concat(BEH_SENT,REMAINING_TEXT,THE_TEXT).
ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,[song|OTHER_TYPES],THE_TEXT):-
  song_sentence(LIST_BIRD1,SONG_SENT),
  ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,OTHER_TYPES,REMAINING_TEXT),
  string_concat(SONG_SENT,REMAINING_TEXT,THE_TEXT).
ofBirds_ofTypes_text(LIST_BIRD,_,[nothing|OTHER_TYPES],THE_TEXT):-
  ofBird_ofTypes_text(LIST_BIRD,OTHER_TYPES,REMAINING_TEXT),
```

```
1745   birdList_birdName(LIST_BIRD, HAS_A_NAME),
1746   strs_flatten(["We know nothing about the ", HAS_A_NAME,"."],
     NOTHING_SENT),
1747   string_concat(NOTHING_SENT,REMAINING_TEXT,THE_TEXT).
1748
1749
1750
1751 % For a birdwatcher, we ought to say something about the males and
1752 % females - more often than not one large, one small, one resplendant,
1753 % one gray fluff - but for nonexistent birds we will do nothing of the
1754 % sort.
1755
1756 compTextPatterns([[comparative,identificatory,distribution,behaviour,song],
1757       [comparative,common_colors,distribution,behaviour,song],
1758       [comparative,distribution,behaviour,song],
1759       [comparative,distribution,identificatory,behaviour,song],
1760       [nothing]]).
1761
1762 comparative_text([LIST_BIRD1,LIST_BIRD2],THE_TEXT):-
1763   birdList_birdName(LIST_BIRD1,A_NAME),
1764   string_upper(A_NAME,A_TITLE),
1765   compTextPatterns(COMP_TEXT_PATTERNS),
1766   random_member(COMP_TEXT_PATTERN,COMP_TEXT_PATTERNS),
1767   ofBirds_ofTypes_text(LIST_BIRD1,LIST_BIRD2,COMP_TEXT_PATTERN,COMP_TEXT),
1768   strs_flatten([A_TITLE,'\n',COMP_TEXT,'\n \n'],THE_TEXT).
1769
1770 % Don't ask me about existent birds though. I own the latest
1771 % edition of the Sibley Guide to Birds, but have only used it to
1772 % identify some kind of swallow that was filling up the nearby trees,
1773 % and one common crane. I took a class on animal diversity and we did a
1774 % unit on birds of paradise - their varying calls, the particular
1775 % excesses of their tails and plumage - but I skipped class that week
1776 % and never got around to making up the reading. I did like birds of
1777 % prey when 8 or 9, but mostly because of their speed and killing. But I
1778 % do stop even when a little late to stare a moment at a thrush in a
1779 % tree or to watch a chicken in the grass, it's head bouncing up with
1780 % grubs.
1781
1782 ofBird_ofTypes_text(_,[],"").
1783
1784 ofBird_ofTypes_text(LIST_BIRD,[identificatory|OTHER_TYPES],THE_TEXT):-
1785   identificatory_sentence(LIST_BIRD,ID_SENT),
1786   ofBird_ofTypes_text(LIST_BIRD,OTHER_TYPES,REMAINING_TEXT),
1787   string_concat(ID_SENT,REMAINING_TEXT,THE_TEXT).
1788 ofBird_ofTypes_text(LIST_BIRD,[distribution|OTHER_TYPES],THE_TEXT):-
1789   distributionAndDiet_sentence(LIST_BIRD,DIST_SENT),
1790   ofBird_ofTypes_text(LIST_BIRD,OTHER_TYPES,REMAINING_TEXT),
1791   string_concat(DIST_SENT,REMAINING_TEXT,THE_TEXT).
1792 ofBird_ofTypes_text(LIST_BIRD,[descriptive|OTHER_TYPES],THE_TEXT):-
1793   descriptive_sentence(LIST_BIRD,DESC_SENT),
1794   ofBird_ofTypes_text(LIST_BIRD,OTHER_TYPES,REMAINING_TEXT),
1795   string_concat(DESC_SENT,REMAINING_TEXT,THE_TEXT).
1796 ofBird_ofTypes_text(LIST_BIRD,[behaviour|OTHER_TYPES],THE_TEXT):-
1797   behaviour_sentence(LIST_BIRD,BEH_SENT),
1798   ofBird_ofTypes_text(LIST_BIRD,OTHER_TYPES,REMAINING_TEXT),
1799   string_concat(BEH_SENT,REMAINING_TEXT,THE_TEXT).
1800 ofBird_ofTypes_text(LIST_BIRD,[song|OTHER_TYPES],THE_TEXT):-
1801   song_sentence(LIST_BIRD,SONG_SENT),
1802   ofBird_ofTypes_text(LIST_BIRD,OTHER_TYPES,REMAINING_TEXT),
1803   string_concat(SONG_SENT,REMAINING_TEXT,THE_TEXT).
```

```
1804 ofBird_ofTypes_text(LIST_BIRD,[nothing|OTHER_TYPES],THE_TEXT):-
1805   ofBird_ofTypes_text(LIST_BIRD,OTHER_TYPES,REMAINING_TEXT),
1806   birdList_birdName(LIST_BIRD, HAS_A_NAME),
1807   strs_flatten(["We know nothing about the ", HAS_A_NAME,"."],
     NOTHING_SENT),
1808   string_concat(NOTHING_SENT,REMAINING_TEXT,THE_TEXT).
1809
1810
1811 % I did airplanes though - the two engined, the four-engined, the now
1812 % mostly extinct three-engined; the curve of nose telling Airbus from
1813 % Boeing; the presence or absence of extra winglets distinguishing A320
1814 % and A340.
1815
1816 desc_text_patterns([[descriptive,identificatory,distribution,behaviour,song]
     ,
1817         [descriptive,identificatory,distribution,behaviour,song],
1818         [descriptive,distribution,behaviour,song]]).
1819
1820 descriptive_text(LISTED_BIRD,THE_TEXT):-
1821   birdList_birdName(LISTED_BIRD,A_NAME),
1822   string_upper(A_NAME,A_TITLE),
1823   desc_text_patterns(DESC_TEXT_PATTERNS),
1824   random_member(DESC_TEXT_PATTERN,DESC_TEXT_PATTERNS),
1825   ofBird_ofTypes_text(LISTED_BIRD,DESC_TEXT_PATTERN,DESC_TEXT),
1826   strs_flatten([A_TITLE,'\n',DESC_TEXT,'\n \n'],THE_TEXT).
1827
1828 % Caged Bird
1829 % BY MAYA ANGELOU
1830 %
1831 % A free bird leaps
1832 % on the back of the wind
1833 % and floats downstream
1834 % till the current ends
1835 % and dips his wing
1836 % in the orange sun rays
1837 % and dares to claim the sky.
1838 %
1839 % But a bird that stalks
1840 % down his narrow cage
1841 % can seldom see through
1842 % his bars of rage
1843 % his wings are clipped and
1844 % his feet are tied
1845 % so he opens his throat to sing.
1846 %
1847 % The caged bird sings
1848 % with a fearful trill
1849 % of things unknown
1850 % but longed for still
1851 % and his tune is heard
1852 % on the distant hill
1853 % for the caged bird
1854 % sings of freedom.
1855 %
1856 % The free bird thinks of another breeze
1857 % and the trade winds soft through the sighing trees
1858 % and the fat worms waiting on a dawn bright lawn
1859 % and he names the sky his own
1860 %
1861 % But a caged bird stands on the grave of dreams
```

```
% his shadow shouts on a nightmare scream
% his wings are clipped and his feet are tied
% so he opens his throat to sing.
%
% The caged bird sings
% with a fearful trill
% of things unknown
% but longed for still
% and his tune is heard
% on the distant hill
% for the caged bird
% sings of freedom.

find_birds(0,[],_,[],_).

find_birds(HOW_MANY,[],INDEX,BIRDS_FOUND,WORDS_FOUND):-
  HOW_MANY >= 1,
  INDEX >= 1,
  a_birdListNum(FIRST_BIRD,INDEX),
  descriptive_text(FIRST_BIRD,FIRST_WORDS),
  ONE_LESS is HOW_MANY - 1,
  NEXT_INDEX is INDEX + 1,
  find_birds(ONE_LESS,[],NEXT_INDEX,OTHER_BIRDS,OTHER_WORDS),
  append(OTHER_WORDS,[FIRST_WORDS],WORDS_FOUND),
  append(OTHER_BIRDS,[FIRST_BIRD],BIRDS_FOUND).

% Something that i think i am particularly troubled by is a sense of
% mechanicity - not so much that I am a mechanichal thing (as my
% language is, as my mathematics and metaphor and desiring), but that i
% am a particularly small and poorly made one; a few rusting pulleys
% roped together and held up by tape and cardboard. Birds strike me as
% the sorts of machines - for watching from trees, for flapping and odd
% song - that i could accept being.

find_birds(HOW_MANY,
[FIRST_OLD_BIRD|OTHER_OLD_BIRDS],INDEX,BIRDS_FOUND,WORDS_FOUND):-
  INDEX >= 1,
  a_relationListNum(FIRST_OLD_BIRD,FIRST_BIRD,INDEX),
  NEXT_INDEX is INDEX + 1,
  find_birds(HOW_MANY,OTHER_OLD_BIRDS,NEXT_INDEX,OTHER_BIRDS,OTHER_WORDS),
  comparative_text([FIRST_BIRD,FIRST_OLD_BIRD],NEW_WORDS),
  append(OTHER_WORDS,[NEW_WORDS],WORDS_FOUND),
  append(OTHER_BIRDS,[FIRST_BIRD],BIRDS_FOUND).

% Surfin' Bird
% THE TRASHMEN
%
% A-well-a, everybody's heard about the bird
% Bird, bird, bird, b-bird's the word
% A-well-a, bird, bird, bird, the bird is the word
% A-well-a, bird, bird, bird, well, the bird is the word
% A-well-a, bird, bird, bird, b-bird's the word
% A-well-a, bird, bird, bird, well, the bird is the word
% A-well-a, bird, bird, b-bird's the word
% A-well-a, bird, bird, bird, b-bird's the word
% A-well-a, bird, bird, bird, well, the bird is the word
% A-well-a, bird, bird, b-bird's the word
% A-well-a, don't you know about the bird
% Well, everybody knows that the bird is the word
% A-well-a, bird, bird, b-bird's the word
```

```
% A-well-a
% A-well-a, everybody's heard about the bird
% Bird, bird, bird, b-bird's the word
% A-well-a, bird, bird, bird, b-bird's the word
% A-well-a, bird, bird, bird, b-bird's the word
% A-well-a, bird, bird, b-bird's the word
% A-well-a, bird, bird, bird, b-bird's the word
% A-well-a, bird, bird, bird, b-bird's the word
% A-well-a, bird, bird, bird, b-bird's the word
% A-well-a, bird, bird, bird, b-bird's the word
% A-well-a, don't you know about the bird
% Well, everybody's talking about the bird
% A-well-a, bird, bird, b-bird's the word
% A-well-a, bird
% Surfin' bird
% Bbbbbbbbbbbbbbbbbb, aaah
% Pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-pa
% Pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-pa-ooma-mow-mow
% Papa-ooma-mow-mow
% Papa-ooma-mow-mow, papa-ooma-mow-mow
% Papa-ooma-mow-mow, papa-ooma-mow-mow
% Ooma-mow-mow, papa-ooma-mow-mow
% Papa-ooma-mow-mow, papa-ooma-mow-mow
% Papa-ooma-mow-mow, papa-ooma-mow-mow
% Oom-oom-oom-oom-ooma-mow-mow
% Papa-ooma-mow-mow, papa-oom-oom-oom
% Oom-ooma-mow-mow, papa-ooma-mow-mow
% Ooma-mow-mow, papa-ooma-mow-mow
% Papa-a-mow-mow, papa-ooma-mow-mow
% Papa-ooma-mow-mow, ooma-mow-mow
% Papa-ooma-mow-mow, ooma-mow-mow
% Papa-oom-oom-oom-oom-ooma-mow-mow
% Oom-oom-oom-oom-ooma-mow-mow
% Ooma-mow-mow, papa-ooma-mow-mow
% Papa-ooma-mow-mow, ooma-mow-mow
% Well, don't you know about the bird
% Well, everybody knows that the bird is the word
% A-well-a, bird, bird, b-bird's the word
% Papa-ooma-mow-mow, papa-ooma-mow-mow
% Papa-ooma-mow-mow, papa-ooma-mow-mow
% Papa-ooma-mow-mow, papa-ooma-mow-mow...

fibonacci_birds(0,[],_,"").

fibonacci_birds(1,BIRD,BIRD,WORD):-
  find_birds(1,[],1,BIRD,WORD).

fibonacci_birds(N,NEW_BIRDS,BIRDS,WORDS):-
  N >= 2,
  NMONE is N - 1,
  NMTWO is N - 2,
  fibonacci(N,FIB_N),
  fibonacci(NMTWO,FIB_NMTWO),
  fibonacci_birds(NMONE,RECENT_BIRDS,OLD_BIRDS,OLD_WORDS),
  find_birds(FIB_NMTWO,RECENT_BIRDS,FIB_N,NEW_BIRDS,NEW_WORDS),
  append(OLD_BIRDS,NEW_BIRDS,BIRDS),
  append(OLD_WORDS,["- \n\n"],PREV_WORDS),
  append(PREV_WORDS,NEW_WORDS,WORDS).

% Beginning early with an odd bird in the hand, one free in the sheet of
```

```
% the sky, or two on the wire.
%
%-
%
% What i am writing about is that i go home, and the next morning we go
% on a hike up the local public park mountain and what we do is carry a
% laminated guide to local wildflowers and at each new blossom stop and
% cluster around the pictures looking at the yellow white purple orange
% or red petals comparing and looking at leaf lengths and saying into
% the wind "California Milkworth," "Purple Larkspur," "Baby Blue Eyes,"
% "Mugwort," "Morning Glory," "Fiddleneck," "Yellow Monkeyflower,"
% "Linseed"
%
%-
%
% In the blurb of Inger Christensen's /Alphabet/, someone calls her a
% "singer of syllables." That's one thing i believe in i guess, the
% saying of the names of things as a kind of prayer or assurance of your
% place among them and towards no other end, to speak in clicking
% noun-phrases and breathing infinitives while walking through both the
% landscape and the words for it.
%
% There is that classic sort of wizardry that operates by knowing and
% speaking, as distinguished from simply recalling and recreating the
% sounds of, names. From Ursula Le Guin's /Earthsea/ for instance "My
% name, and yours, and the true name of the sun, or a spring of water,
% or an unborn child, all are syllables of the great word that is very
% slowly spoken by the shining of the stars. There is no other power. No
% other name." Something else i like about this kind of Young Adult
% wizardry is the suspicion of the power in it: how the knowledge of a
% person's actual name gives a total and dangerous kind of control over
% them; the namer of birds, there, is a maker of lists but also
% responsible for the unpredictable and at times incendiary or
% entrapping results of speaking their grimoire.
%
%-
%
% Code is language that does fixed things.
%
% Code is not what this is about but it is one of the things that it is
% about because, for all of programming's silliness obscurity and
% economics, in its sentences one can glimpse every now and then,
% through the For loops and cautious architectures of parenthesis,
% inside the obscure formal spacing and odd capitalization, traces of
% the old original magic: words, utterances that some opaque and not
% human thing hears and responds to.
%
% The rhetoric of almost all programming is the rhetoric of either the
% imperative or of the declarative: in the first the programmer tells
% their variables what they are, what they will do, what they will
% mutate into, and eventually how they will be written or acted upon;
% functional programming describes how one sort of code-thing makes
% another code-thing, and writes the rules for these subtle growths and
% transformations until one finds themselves writing rules about rules,
% and rules about rules about rules. Logic programming however, as this
% document mostly is, is an attempt at a third approach: in Prolog one
% describes a system of things, and if this constructed place is a
% possible one the interpreter finds it, assembles the pieces from
% basic blocks, and shows you the discovered landscape.
%
```

```
%-
%
% Consider an eccentric, aspiring, and trust-fund supported
% ornithologist who absolutely refuses to step out of their room.
%
% Birds occasionally fly past their window or rest on a distant branch,
% but each too quickly or at just too much of a distance for the
% Ornithologist At Their Window to do more than observe one feature or a
% rough outline of.
%
% This eccentric however feels for whatever reason compelled to sit for
% hours daily at their desk with a pen and a notebook, assembling these
% remembered fragments into descriptions of the birds which they imagine
% they might have seen. They might tell the way a blue neck inflates and
% contracts over indigo wings, or the three syllable screeching of
% certain hawks. It is important for this story that the only way we can
% write about this author is to talk about how they write their
% ornithology; much later, someone finds the enormous stack of notebooks
% they leave behind containing nothing but potential birds. The contents
% of their notebooks are published on someone else's whim.
%
% Now imagine walking outside with this guide, down to the slough in
% Spring or into hills, and seeing a bird on a branch of an oak, or
% wading through the muck.
%
% You open the Book of Potential Birds and flip for a while through
% its exhaustive pages, learning to navigate its oddly ordered
% sections. The bird is in no rush to get anywhere else, has a long
% stripe accross its torso, and hobbles and bobs along. Now you find an
% entry in the book that - though its author never saw the bird in front
% of you, describes exactly its size, motion, and one stripe. The book
% tells you the bird makes a harsh and doubled whistling; this time,
% the bird you are watching a body's length away makes a harsh and
% doubled whistling.
%
%-
%
% There are birds in the backyard: after metaphor, fact and background
% noise.
%
% Over fig blossoms a green one is humming, still as the landscape moves
% around it.
%
% On the fence at the back of the property, seen through the leaves of
% the apricot tree are three gray and brown animals, to my untrained
% eyes the only description for their shape "bird": a doubly bent curve,
% simple beak, a bulge and suggestion of wings, the thin toes wrapped
% round wood and the paper fan of tail behind. Their heads and torsos
% turn occasionally and at once; they strut along the walk. They
% pause. Then, they fly up at my approach and land back three feet
% further down along the wood.
%
% Two sleek and brown-chested specimens pick at the fallen apricots or
% the grubs buried in the fruits opened orange matter.
%
% One small and dark and gray thrashes around somehow within air, as if
% touching and thrown back by invisible walls which its wings find and
% shove.
%
% A long way up two bent flecks, making somewhere small running shadows,
```

```
% drift.
%
% Another bird with a dark crest, white neck, neatly splayed tail,
% the kind of bird for the birdwatchers or the hikers at their cameras,
% rests a few moments in another long-leaved tree, before setting the
% branch vibrating as the blur of it dives up and swims in air.
%
% The background noise, as it almost invariably is, is a range of bird
% whistles, chirps, and chittering - the apparent peaks each with their
% own jagged and private contour - that stand against each other; now a
% wail that comes in threes, rising, dropping, while from another ear's
% side of the yard a full paragraph of evenly spaced and paper-thin
% notes scatters, with an undertone of insects vibrating and, if you
% listen very carefully, the refrigerator.
%
% -
%
% There is a 13 paragraph story-shaped hole here, and what i am doing is
% looking for the noises or meanings that could succesfully fill out or
% scaffold it; reaching for birds: consider a landscape the birds have
% deserted - electric wires just strings sagging their symmetric natural
% sag, braches and leaves that jiggle predictably to wind, fences which
% designate boundaries and have nothing to interrupt their tops.
%
% The topography of this birdless place is the same as it was, more or
% less, but the place somehow seems empty as a page, as though it was
% existing before to hold birds, as though while watching this landscape
% you are really waiting for the birds and their utterances to inhabit
% it, and are now looking for where they will enter it again: on the
% branches, along the fence, or clutching the wire.
%
% Maybe birds are parralel and alternate societies, civilizations we
% look into to restructure or make contingent ours: buildings of rooks,
% and coveys of partridges; murmurations of starlings, casts of hawks,
% and the inevitable murders of crows; some parliaments of owls, and a
% watch of nightingales. To sit in the parliamentary chamber observing
% unceasing arguments in an unspoken language.
%
% Alternately, maybe single birds are instead examples of the
% metamorphosed bodies an inacessible person becomes: the understanding
% of herons and cruelty of ravens; wisdom of owls, grace of swans, and
% morbid despair of vultures. The way the animal cannot protest the
% story told of it without its call being made back into story, or to
% praise.
%
% Something else i like and look for is the moment when a metaphor gets
% so involved in its details that it no longer appears to be a map to
% somewhere else, but its own place - parables that get lost in
% themselves, like Aesop's Fables or Calvino's /Cosmicomics/; i believe
% in maps, in the possibility of paraphrase - that, at the end of the
% day, our explanations usually can do what we need them to - but also
% that there is something else to be found in the contour of the drawn
% coastline, a way in which the pencil finding the inlets and little
% islands also begins to undertand the possible joy and reasons behind
% its own motion. I think one could read The Sibley Guide to Birds,
% as a magic-realist collection of prose-poetry now, if there were no
% birds around at all.
%
% 'Consider a language-game between a birdwatcher A and a
% nature photographer B. A is photographing birds: there are grebes,
```

```
% thrushes, swallows, and wrens. B has to find and name the birds in the
% order in which A wants to photograph them. For this purpose, they use
% a language consisting of the words "grebe," "thrush," "swallow," and
% "wren." A calls them out; B finds and points to the bird they have
% learned to find at such-and-such a call. Concieve this as a complete
% primitive language.' Consider a sendentary creature who returns
% through all seasons to the same three or four perches (i'm trying to
% avoid autobiography, but only find myself explaining what i imagine i
% do and do not understand of myself).
%
% Raymond Queneau's motto: "Rats who build the labyrinth from which they
% will try to escape"
%
% Georges Perec's: "I set myself rules in order to be totally free"
%
% This is not the logic of birds of course, but the logic of a mind
% making a logic for the birds already in its private landscape: i do
% not hope to find the actual patterns of ornithology, but only to
% consider some of the odd extravagant and particular birds of a logic;
% it is not the still polygon of the stuffed specimen but the blur of
% the hovering hummingbird's wings that i want to watch and understand:
% or maybe what is interesting is actually the counterpoint between
% polygon and motion.
%
% I do remember walking through the coastal forest where an osprey was
% and the binoculars on a string around my neck. I do not really
% remember the bird beyond the flash of some section of white and the
% signification of wings, but i remember talking and reading about it
% afterwards, in our place a rare bird, fish-eater and diver, nesting
% on large sticks placed in a dead tree. I remember kestrels on
% telephone wires and boring vultures. A hawk or swift that one morning
% we found after a thunderclap from the living room window: shaking in a
% pile there for some minutes as we wondered whether there was someone
% one is supposed to call about dying birds, when it gathered itself up
% and flapped off.
%
% A speculation (not true or untrue but perhaps with the sound of
% potentially resonant things, that can catch and keep an ear for the
% duration of their utterance and which later a mouth may find itself
% repeating a variation on): birdsong is the place where names and
% things line up; where, for the length of such a song, the landscape
% and its language can be figure and ground of the same place; a
% rabbit running from the hawk's shadow, the hawk directing the
% darkening of grass after the rabbit.
%
% You are taking a break now, finding a window, finding the bird in it,
% giving it a minute, coming back after.
%
% "Maybe sparrow it's too late / Moonlight glanced off metal wings / In
% a thunderstorm above the clouds / The engine hums a sparrow's phrase
% / For those who cannot hear the words / For those who will not hear
% the words / For those who will not hear the words / La di da di da di
% da / La di da di da di da" - Neko Case

lots_ofBirdWords(N,THE_TEXT):-
  get_time(NOW),
% "Lightning -
  fibonacci_birds(N,_,_,THE_WORDS),
% Heron's cry
  append([["The Guide to Nonexistent Birds:",
```

```
2221      " an Ornithological Logic",
2222      "\n\nSECTION ",NOW,":\n\n",
2223      "* * ** *** ***** ******** *************",
2224      "\n\n"],
2225     THE_WORDS],ALL_WORDS),
2226   strs_flatten(ALL_WORDS,THE_TEXT),
2227 % Stabs the darkness" - BASHO (trans. unknown)
2228   writef(THE_TEXT).
2229
2230 guideToNonexistentBirds(BIRD_WORDS):-
2231   lots_ofBirdWords(7,BIRD_WORDS),
2232   open('GuideToNonexistentBirds.txt',write,THE_BOOK),
2233   write(THE_BOOK,BIRD_WORDS),
2234   close(THE_BOOK).
2235
2236 % Freebird
2237 % LYNRYD SKYNYRD
2238 %
2239 % If I leave here tomorrow
2240 % Would you still remember me?
2241 % For I must be traveling on now
2242 % 'Cause there's too many places I've got to see.
2243 %
2244 % But if I stayed here with you, girl,
2245 % Things just couldn't be the same.
2246 % 'Cause I'm as free as a bird now,
2247 % And this bird you can not change, oh, oh, oh, oh.
2248 % And this bird you can not change.
2249 % And this bird you can not change.
2250 % Lord knows I can't change.
2251 %
2252 % Bye, bye, baby, it's been a sweet love, yeah,
2253 % Though this feeling I can't change.
2254 % But please don't take it so badly,
2255 % 'Cause Lord knows I'm to blame.
2256 %
2257 % But if I stayed here with you, girl,
2258 % Things just couldn't be the same.
2259 % 'Cause I'm as free as a bird now,
2260 % And this bird you'll never change, oh, oh, oh, oh.
2261 % And this bird you cannot change.
2262 % And this bird you cannot change.
2263 % Lord knows, I can't change.
2264 % Lord, help me, I can't change.
2265 %
2266 % Lord, I can't change.
2267 % Won't you fly high, free bird, yeah?
2268
2269 say_birds(_Request) :-
2270     guideToNonexistentBirds(BIRD_WORDS),
2271     reply_html_page(
2272       [title('The Guide to Nonexistent Birds: an Ornithological Logic')],
2273       [
2274       pre(style="white-space: pre-wrap; width:45%; height:100%; float:
     right", BIRD_WORDS),
2275       iframe([src='OrnithologicalLogic.pdf', style='width:50%; height:95%;
     float: left; margin: 4px 10px 0px 0px; position: fixed'],[])]).
```