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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, 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)
 */

/*
 *
 * 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
 *
 */

% 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 capital 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),

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    FIB_N is FIB_NMON + FIB_NMTWQ

strs_flatten(STR_LIST, FLAT_STR) :-
    maplist(string_chars, STR_LIST, CHAR_LIST$,
    flatten(CHAR_LIST$, FLAT_CHAR$,
    string_chars(FLAT_STR, FLAT_CHAR$).

make_pairs([E1], [E2], [[E1, E2]]).

make_pairs([H1|T1], [H2|T2], PAIRS) :-
    FIRST_PAIR = [H1, H2],
    make_pairs(T1, T2, REST_OF_PAIR$,
    PAIRS = [FIRST_PAIR|REST_OF_PAIR$].

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_CHAR$).

get_head([H|_], H).
get_second(_, [S], S).

/*
 * THIRTEEN WAYS OF LOOKING AT A BLACKBIRD
 * Wallace Stevens
 *
 * I
 * Among twenty snowy mountains,
 * The only moving thing
 * Was the eye of the blackbird.
 * ...
 */

% We will start with a few names necessary for any bird watcher, or
% bird-imaginer

birdFamilies(["thrush", "tinamou", "egret", "hawk", "eagle", "duck", "partridge", "brush-turkey", "grebe", "coot", "swallow", "grouse", "guineafowl", "woodpecker", "shellduck", "barbet", "vulture", "gull", "flycatcher", "swift", "albatross"]).

colors(["brown", "blue", "red", "golden", "crimson", "white", "black", "gray", "yellow", "violet"]).
birdParts(["tail", "wing", "head", "beak", "throat", "shoulder", "breast", "crest", "neck"]).
climes(["tropical", "arctic", "coastal", "prairie", "river", "forest", "mountain"]).
cardDirs(["north", "south", "east", "west"]).
rarities(["common", "uncommon", "rare"]).
descTypes([coloredPart, clime, cardDir, rarity]).
partFeatures(["speckled", "mottled", "tufted", "striped", "narrow", "large", "bright"]).
birdDiets([small_vegetarian, omnivorous, carnivorous, pescatarian]).

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"]).
clime_climePlaces"forest", ["treetops", "undergrowth", "bushes", "branches"]).
clime_climePlaces"mountain", ["cliffsides", "pine stands", "bushes"]).

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% And start naming them - maybe pointing in a room of taxidermied
% coots and grebes, eagles and egrets, watching you from paper-mached
% perches.

birdFamily(FAMILY):- birdFamilies(1, member(FAMILY,1)).
color(COLOR):- colors(1, member(COLOR,1)).
birdPart(BIRD PART):- birdParts(1, member(BIRD PART,1)).
clime(CLIME):- climes(1, member(CLIME,1)).
cardDir(CARD DIR):- cardDirs(1, member(CARD DIR,1)).
rarity(RARITY):- rarities(1, member(RARITY,1)).
descType(DESC TYPE):- descTypes(1, member(DESC TYPE,1)).
birdDiet(DIET):- birdDiets(1, member(DIET,1)).
partFeature(PART FEATURE):- partFeatures(1, member(PART FEATURE,1)).

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 * 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("thrush",SEED):- 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("hawk",SEED):- SEED >= 0.15, SEED < 0.3.
birdFamily_seed("eagle",SEED):- SEED >= 0.3, SEED < 0.35.
birdFamily_seed("duck",SEED):- SEED >= 0.35, 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.

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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 < 0.98.
birdFamily_seed"albatross",SEED):- SEED >= 0.98.

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.
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.

descType_seedcoloredPart,SEED):- SEED < 0.5.
descType_seedclime, SEED):- SEED >= 0.5, SEED < 0.75.
descType_seedcardDir, SEED):- SEED >= 0.75, SEED < 0.9.
descType_seedrarity, SEED):- SEED >= 0.9.

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.

% Build the birdhouse, and paint it; buy from Lowe's or Home Depot a bag
% of birdseeds; fill the little bowl with water; fill the floor with the
% seeds; see if something comes; hope it isn't a squirrel (throw dirt
% clods if it is, watch from the windows if not).

a_birdFamilyBIRD_FAMILY:- random(S), birdFamily_seedB(BIRD_FAMILY,S).

```

```

a_color(COLOR):- random(S), color_seed(COLOR,S).
a_birdPart(BIRD_PART):- random(S), birdPart(BIRD_PART), birdPart_seed(BIRD_PART,S).
a_clime(CLIME):- random(S), clime_seed(CLIME,S).
a_cardDir(CARD_DIR):- random(S), cardDir(CARD_DIR), 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).
a_partFeature(PART_FEATURE):- random(S), partFeature_seed(PART_FEATURE,S).

```

```

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 * Wallace Stevens
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 * 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.
 * ...
 */

```

```

% Walk towards the feathery thing a step at a time, crunching no twigs;
% place the binoculars over your eyes, and twiddle the dials until you
% can distinguish leaf from leaf, and feather from feather

```

```

attribute_descfamily, FAMILY OF THAT BIRD ITS GRANDPARENTS AND NEICES-
birdFamilyFAMILY OF THAT BIRD ITS GRANDPARENTS AND NEICES
attribute_desccoloredPart, PART OF A BIRDCOLOR OF A PART OF THAT BIRD:-
birdPartPART OF A BIRD, colorCOLOR OF A PART OF THAT BIRD
attribute_descclime, THEIR PREFERRED KIND OF WIND AND VEGETATION-
clime(THEIR PREFERRED KIND OF WIND AND VEGETATION
attribute_descrarity, THOSE MULTITUDES):-
rarity(THOSE MULTITUDES).
attribute_desccardDir, THAT BIRDS PREFERENCE IN COMPASSES:-
cardDir(THAT BIRDS PREFERENCE IN COMPASSES

```

```

% Standing in a city rock doves with green glimmering throats
% twitter around you; under the ornamental bridge, gliding mallards
% congregate; to the dead hedgehog flesh-headed vultures swoop; on
% imagined branches that flicker, wingless blackbirds land

```

```

an_attribute_descfamily, A FAMILY FOR THAT BIRD AUNTS UNCLES SIBLINGS-
a birdFamilyA FAMILY FOR THAT BIRD AUNTS UNCLES SIBLINGS
an_attribute_desccoloredPart, A PART OF THAT BIRDA COLOR OF A PART OF THAT BIRD):-
a birdPartA PART OF THAT BIRD, a_colorA COLOR OF A PART OF THAT BIRD
).
an_attribute_descclime, A PREFERRED KIND OF WIND AND VEGETATION-
a climeA PREFERRED KIND OF WIND AND VEGETATION
an_attribute_descrarity, WHAT MULTITUDES):-
a_rarity(WHAT MULTITUDES).
an_attribute_desccardDir, HOLD A COMPASS UNDER IT:-
a_cardDirHOLD A COMPASS UNDER IT

```

```
% 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"
```

```
desc_name(coloredPart, THE PART, THE COLOR, THE DESC STR):-
    strs flatten([THE COLOR, "-", THE PART, "ed"], THE DESC STR).
desc_name(clime, [THE CLIME], THE DESC STR):-
    THE DESC STR= THE CLIME.
desc_name(cardDir, [THE CARD DIR], THE DESC STR):-
    strs flatten([THE CARD DIR, "ern"], THE DESC STR).
desc_name(rarity, [THE RARITY], THE DESC STR):-
    THE DESC STR= THE RARITY.
desc_name(family, [THE FAMILY], THE DESC STR):-
    THE DESC STR= THE FAMILY.
```

```
/*
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 *
 * 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
 * it's a useful reminder that you can watch so many birds' wings and
 * still be stuck in human time and things))
 */
```

```
% Now sit behind your backyard window, grab an extra page accidentally
% printed - find a pencil, and start making its shape. Take out the
```

```
% watercolors, and brush in, moving from light to dark, quick washes. It
% will fly away before you're done, but probably no one will notice the
% imprecisions of pigment and proportion its absence leaves.
```

```
that_piece_of_that_bird_in_that_color(THAT_PIECE_OF_THAT_BIRD,THAT_PIECE_OF_THAT_PIECE_OF_THAT_BIRD,IN_THAT_COLOR):-
    birdPart(THAT_PIECE_OF_THAT_BIRD,
-        color(IN_THAT_COLOR,
            attribute_desc(coloredPart,THAT_PIECE_OF_THAT_BIRD,IN_THAT_COLOR)).
```

```
colors_of_parts_of_that_bird(THE_PIECES_IN_COLORS:-
    birdParts(THE_PIECES_OF_THAT_BIRD,
        maplist(that_piece_of_that_bird_in_that_color,THE_PIECES_OF_THAT_BIRD,THE_PIECES_IN_COLORS).
```

```
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_PIECES_IN_SOME_COLORS).
```

```
% Now, it is well known that your blue and my blue may or may not be the
% same blue, but, beyond thought experiment, after examining rods and
% cones and counting them and counting wave lengths, and some other such
% things, we also know more or less definitively that birds see some
% totally different shades of blue and off-blue, particularly some
% ultraviolet ones, 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 RELATION,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 RELATION,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 RELATION,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 RELATION,NAME THE RELATIONS,
    strs_flatten(NAME THE COLORED PART" ",NAME THE RELATIONS,NAME IT).
```

```
% Consider a bird through a window. It's a small fluffed mass -
% vibrating, folded up. Lacking better names for it, call it A Little
% Brown Thing.
```

```
a_name_ofType(clime,NAME IT,COLOR IT,COUNT IT,LOCATE IT,POINT,FIND ITS RELATIONS):-
    name_for(clime,NAME IT,COLOR IT,COUNT IT,LOCATE IT,POINT,FIND ITS RELATIONS).
```

```

a_name_ofType cardDir,NAME IT,COLOR IT,COUNT IT,LOCATE IT,POINT,FIND ITS RELATI
ONS):-
    name_for(cardDir,NAME IT,COLOR IT,COUNT IT,LOCATE IT,POINT,FIND ITS REL
ATIONS).

```

```

a_name_ofType rarity,NAME IT,COLOR IT,COUNT IT,LOCATE IT,POINT,FIND ITS RELATIC
NS):-
    name_for(rarity,NAME IT,COLOR IT,COUNT IT,LOCATE IT,POINT,FIND ITS RELA
TIONS).

```

```

a_name_ofType coloredPart,NAME IT,COLOR IT, , , ,FIND ITS RELATIONS:-
    a_birdPart$SOME PART,
    THE COLORED PART= [SOME PART, ],
    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).

```

```

% One from the Spring flock on the nearby tree lands in front of you -
% brown-winged, white-throated, large as a butternut squash. When you
% step towards it, it leaps an equal amount back. When you step away, it
% steps the same distance forward. When you step twice it flaps back up
% into the big tree.

```

```

bird(NAME IT,COLOR IT,COUNT IT,LOCATE IT,POINT,FIND ITS RELATION,SWEIGH IT):-
    string(NAME IT),
    colors_of_parts_of_that_bird(COLOR IT),
    attribute_desc(rarity,COUNT IT),
    attribute_desc(clime,LOCATE IT),
    attribute_desc(cardDir,POINT),
    birdFamily,FIND ITS RELATIONS,
    1 =< WEIGH IT,
    WEIGH IT=< 10.

```

```

a_bird(NAME,COLORS,COUNT,LOCATE,POINT,FIND_RELATION,SWEIGH IT):-
    colors_of_parts_of_a_bird(COLORS),
    an_attribute_desc(rarity,COUNT),
    an_attribute_desc(clime,LOCATE),
    an_attribute_desc(cardDir,POINT),
    an_attribute_desc(family,FIND_RELATIONS$,
    a_descType$A NAME TYPE$,
    random_between(1,10,WEIGH IT),
    a_name_ofType$A NAME TYPE$,NAME,COLORS,COUNT,LOCATE,POINT,FIND_RELATIONS
).

```

```

a_bird_ofFamily(NAME,COLORS,COUNT,LOCATE,POINT,ITS_RELATIONS,SWEIGH IT):-
    colors_of_parts_of_a_bird(COLORS),
    an_attribute_desc(rarity,COUNT),
    an_attribute_desc(clime,LOCATE),
    an_attribute_desc(cardDir,POINT),
    a_descType$A NAME TYPE$,
    random_between(1,10,WEIGH IT),
    a_name_ofType$A NAME TYPE$,NAME,COLORS,COUNT,LOCATE,POINT,ITS_RELATIONS$
.

```

```

% To identify a bird quickly, note the shape of the wings in profile,
% black against sunlight; or count toes; forget the background tree,
% forget the ruffle of feathers, but maybe count a flock; dappled
% sunlight is distracting but forgetting it, as painters but not
% cameras do, the distinction between speckled and striped is a sure
% way to tell thrush from thrush; the difference, between 2 and 5 cm, in
% the length of a white brow stripe can identify Siberian from East

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% Asian variants of a swallow; plumage patterns of the juvenile are
% different and require another chart.

list_bird(About A Bird,Name,Colors,Count,Locate,Point,Find Relation,Weigh It) :-
-
    About A Bird = [Name,Colors,Count,Locate,Point,Find Relation,Weigh It]
.

birdList(Bird List):-
    bird(N,CP,CN,L,P,F,S),
    list_bird(Bird List,N,CP,CN,L,P,F,S).

birdList_birdName(Listed Bird,Its Name):-
    nth0(0,Listed Bird,Its Name).

birdList_birdColors(Listed Bird,Its Colors):-
    nth0(1,Listed Bird,Its Colors).

birdList_birdRarity(Listed Bird,Its Rarity):-
    nth0(2,Listed Bird,Its Rarity).

birdList_birdClimate(Listed Bird,Its Climate):-
    nth0(3,Listed Bird,Its Climate).

birdList_birdDir(Listed Bird,Its Dir):-
    nth0(4,Listed Bird,Its Dir).

birdList_birdFamily(Listed Bird,Its Family):-
    nth0(5,Listed Bird,Its Family).

birdList_birdSize(Listed Bird,Its Size):-
    nth0(6,Listed Bird,Its Size).

a_birdList(About A Bird):-
    a_bird(Name,Colors,Count,Locate,Point,Find Relation,Weigh It),
    list_bird(About A Bird,Name,Colors,Count,Locate,Point,Find Relation,Weigh It).

a_birdList(_,About A Bird):-
    a_birdList(About A Bird).

a_birdList_ofFamily(Its Relation,About A Bird):-
    a_bird_ofFamily(Name,Colors,Count,Locate,Point,Its Relation,Weigh It),
    list_bird(About A Bird,Name,Colors,Count,Locate,Point,Its Relation,Weigh It).

a_relationList(Old Bird,Related Bird):-
    birdList_birdFamily(Old Bird,The Fam),
    a_birdList_ofFamily(The Fam,Related Bird).

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*
* 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 wings))
*
*/

```

```

birdFamily_diet(FAMILY, small_vegetarian):-
    FAMILY = "thrush";
    FAMILY = "swallow";
    FAMILY = "swift";
    FAMILY = "flycatcher";
    FAMILY = "barbet".

```

```

birdFamily_diet(FAMILY, omnivorous):-
    FAMILY = "tinamou";
    FAMILY = "partridge";
    FAMILY = "grouse";
    FAMILY = "guineafowl";
    FAMILY = "woodpecker".

```

```

birdFamily_diet(FAMILY, pescatarian):-
    FAMILY = "egret";

```

```

    FAMILY = "grebe";
    FAMILY = "coot";
    FAMILY = "duck";
    FAMILY = "shellduck";
    FAMILY = "gull";
    FAMILY = "albatross".

birdFamily_type(FAMILY,carnivorous):-
    FAMILY = "hawk";
    FAMILY = "eagle";
    FAMILY = "vulture".

% Weigh a pile of feathers against an egg; measure wingspan in talons;
% look for stripes and count spots; compare speckling and distinguish
% blue hues

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".

```

```
% And now, a brief break for ode-singing -  
  
bird_chirps(["ki","rik","chi","er","tee","oo"]).  
  
% Ode to a Nightingale  
% John Keats  
%  
% My heart aches, and a drowsy numbness pains  
% 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 perplexes 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 than ever seems it rich to die,
%      To cease upon the midnight with no pain,
%      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 intervals.
%
%
%      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?
```

```
% 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.
%
% (So sing thing, sing)
```

```
part_phrase PART,LIST THE BIRDTALK ABOUT THAT:-
    birdList birdColors(LIST THE BIRDPALL THE BIRD),
    member([PART,ITS COLOR], ALL THE BIRD),
    strs_flatten([ITS COLOR," ",PART],TALK ABOUT THAT).
```

```
a_part_phrase LIST THE BIRDTALK ABOUT IT:-
    a birdPartA PART),
    part_phraseA PART,LIST THE BIRDTALK ABOUT IT.
```

```
% When they stop writing, 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.
```

```
comparative_phrase LIST BIRD1,LIST BIRD2,COMP PHR):-
    birdList birdSize(LIST BIRD1,B1 SIZE),
    birdList_birdSize(LIST_BIRD2,B2_SIZE),
```

```

        comparison_strs(1 SIZE,B2 SIZE,COMP STR),
        strs_flatten([" is", COMP STR,COMP PHR].

numCompSentTypes$4).

% All this all is flipping a bunch of switches, but the right
% question i think is, what switches and why, how can we, with them,
% draw a bluebird or a draw a blackbird better

comparativeInfo_sentence$1 NAME,B2 NAME,COMP PHR,DESC1,DESC2,COMP SENT):-
    numCompSentTypes(NUM SENT TYPE$),
    random_between(1,NUM SENT TYPE$,SENT TYPE), comparativeInfo_sentence$1
NT_TYPE,B1 NAME,B2 NAME,COMP PHR,DESC1,DESC2,COMP SENT).

comparativeInfo_sentence$4,B1 NAME,B2 NAME,COMP PHR,DESC1,DESC2,COMP SENT):-
    strs_flatten(["The ",B1 NAME,COMP PHR," the ",B2 NAME," with a ",DESC1,
" and ",DESC2,". "],COMP SENT).
comparativeInfo_sentence$6,B1 NAME,B2 NAME,COMP PHR,DESC1,DESC2,COMP SENT):-
    strs_flatten(["The ",B1 NAME," most closely resembles the,B2 NAME,"
but",COMP PHR," it, with a ",DESC1," and ",DESC2,". "],COMP SENT).
comparativeInfo_sentence$5,B1 NAME,B2 NAME,COMP PHR,DESC1,DESC2,COMP SENT):-
    strs_flatten(["With a ",DESC1," and ",DESC2," the ",B1 NAME,COMP PHR,"
the ",B2 NAME,". "],COMP SENT).

comparativeInfo_sentence$4,B1 NAME,B2 NAME,COMP PHR,DESC1,DESC2,COMP SENT):-
    strs_flatten(["The ",B1 NAME,COMP PHR," the ",B2 NAME," and is notable
for its ",DESC1," and ",DESC2,". "],COMP SENT).

comparative_sentence$1,LIST BIRD1,LIST BIRD2,COMP SENT):-
    birdList_birdName(LIST BIRD1,B1 NAME),
    birdList_birdName(LIST BIRD2,B2 NAME),
    birdParts(B PARTS),
    random_member(PART1,B PARTS),
    delete(B PARTS,PART1,OTHER B PARTS),
    random_member(PART2,OTHER B PARTS),
    part_phrase(PART1,LIST BIRD1,DESC1),
    part_phrase(PART2,LIST BIRD1,DESC2),
    comparative_phrase(LIST BIRD1,LIST BIRD2,COMP PHR),
    comparativeInfo_sentence$1 NAME,B2 NAME,COMP PHR,DESC1,DESC2,COMP SENT
).

comparative_sentence$1,LIST BIRD1,LIST BIRD2,COMP SENT):-
    comparative_sentence$1,LIST BIRD1,LIST BIRD2,COMP SENT).

numDescSentTypes$3).

descriptiveInfo_sentence$1,BIRD NAME,BFAMILY,DESC1,DESC2,DESC SENT):-
    numDescSentTypes(NUM SENT TYPE$),
    random_between(1,NUM SENT TYPE$,SENT TYPE),
    descriptiveInfo_sentence$1,SENT_TYPE,BIRD NAME,BFAMILY,DESC1,DESC2,DESC S
ENT).

descriptiveInfo_sentence$4,BIRD NAME,DESC1,DESC2,DESC SENT):-
    strs_flatten(["The ",BIRD NAME," has a ",DESC1," and a ",DESC2,". "],DE
SC SENT).

descriptiveInfo_sentence$6,BIRD NAME,DESC1,DESC2,DESC SENT):-
    strs_flatten(["The ",BIRD NAME," is notable for its ",DESC1," and its "
,DESC2,". "],DESC SENT).

descriptiveInfo_sentence$5,BIRD NAME,[ITS FAMILY],DESC1,DESC2,DESC SENT):-
    strs_flatten(["A ",ITS_FAMILY," with a ",DESC1," and a ",DESC2," is the

```

```

",BIRD_NAME",". "] ,DESC SENT) .

descriptive_sentence(LISTED BIRD,DESC SENT):-
    birdList birdName(LISTED BIRD,BIRD_NAME),
    birdParts B PARTS,
    birdList birdFamily(LISTED BIRD,BFAMILY),
    random member(PART1,B PARTS),
    delete(B PARTS,PART1,OTHER B PARTS),
    random member(PART2,OTHER B PARTS),
    part_phrase(PART1,LISTED BIRD,DESC1),
    part_phrase(PART2,LISTED BIRD,DESC2),
    descriptiveInfo sentence(BIRD_NAME,BFAMILY,DESC1,DESC2,DESC SENT) .

identificatoryInfo_sentence(PART1 FEATURE PART1, PART2 FEATURE PART2, ID SENT
):-
    strs flatten(["One can be identified by its, "PART1 FEATURE" ", PART1
, " and its ", PART2 FEATURE" ",PART2,". "] ,ID SENT) .

identificatory_sentence(ID_SENT):-
    birdParts B PARTS,
    random member(PART1,B PARTS),
    delete(B PARTS,PART1,OTHER B PARTS),
    random member(PART2,OTHER B PARTS),
    a_partFeature(PART1 FEATURE),
    a_partFeature(PART2 FEATURE),
    identificatoryInfo sentence(PART1 FEATURE PART1, PART2 FEATURE PART2,
ID_SENT) .

% There are estimated to be 19,000,000 mallards to 50 crested
% shellducks. Between 350 and 1500 scarlet banded barbets on the summit
% of a solitary Peruvian mountain to between 73.5 million and 216
% million great spotted woodpeckers, over 40,000,000 willow ptarmigans
% and 1679 flightless cormorants. Some billions, maybe hundreds of
% billions, overall. Someone sits on the rocky beach in rain-pants
% twisting bands round roughly feathered legs.

rarity_advRarity("common","often").
rarity_advRarity("uncommon","sometimes").
rarity_advRarity("rare","occasionally").

rarity_Rarity(RARE,RARELY):-
    strs_flatten([RARE,"ly"],RARELY) .

clime_somePlace(THI CLIME,THE PLACE):- clime climePlaces(THI CLIME,POSSIBLE PLA
CES), random member(THI PLACE,POSSIBLE PLACES).

clime_someOtherPlace(THI CLIME,THAT PLACE,ANOTHER PLACE):- clime climePlaces(THI
CLIME,POSSIBLE PLACES),delete(POSSIBLE PLACES,THAT PLACE,REMAINING PLACES),ra
ndom member(ANOTHER PLACE,REMAINING PLACES).

% 8 COUNT
% Charles Bukowski
%
% from my bed
% I watch
% 3 birds
% on a telephone
% wire.
%
% one flies
% off.

```

```

% then
% another.
%
% one is left,
% then
% it too
% is gone
%
% my typewriter is
% tombstone still.
%
% and I am
% reduced to bird
% watching.
%
% just thought I'd
% let you
% know,
% fucker.

distribution_sentence(LISTED BIRD,DIST SENT):-
    birdList birdName(LISTED BIRD,NAME FOR EM,
    birdList birdRarity(LISTED BIRD,[HOW MANY]),
    birdList birdDir(LISTED BIRD,POINT WHERE),
    birdList birdClima(LISTED BIRD,[WHAT WEATHER]),
    clime somePlace(WHAT WEATHER,WHERE),
    clime someOtherPlace(WHAT WEATHER,WHERE,WHERE ELSE),
    rarity advRarity(HOW MANY,HOW MANYLY),
    desc name(cardDir,POINT WHERE,WHERE POINTED),
    capitalize first(NAME FOR EM,THEM NAMED),
    distributionInfo_sentence(EM,NAMED,HOW MANYLY,WHERE POINTED,WHERE,WHE
RE ELSE,DIST SENT).

distributionInfo_sentence(EM,NAMED,HOW MANYLY,WHERE POINTED,WHERE,WHERE ELSE,
DIST SENT):-
    strs flatten(EM,NAMED,"s can ",HOW MANYLY," be found in ",WHERE POIN
TED," ",WHERE," or ",WHERE ELSE,"."],DIST SENT).

/*
* 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.
*
* IX
* When the blackbird flew out of sight,
* It marked the edge
* Of one of many circles.
*
* X
* At the sight of blackbirds
* Flying in green light,
* Even the bawds of euphony
* Would cry out sharply.
*
* 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 requiring inventing people, and that is
```

```

% beyond the scope of this particular project.

ofBirds_ofTypes_text( , [], "" ).
ofBirds_ofTypes_text( LIST_BIRD1, LIST_BIRD2, [comparative|OTHER_TYPE$, THE_TEXT] :
-
    comparative_sentence( LIST_BIRD1, LIST_BIRD2, COMP_SENT ),
    ofBirds_ofTypes_text( LIST_BIRD1, LIST_BIRD2, OTHER_TYPE$, REMAINING_TEXT,
        string_concat( COMP_SENT, REMAINING_TEXT, THE_TEXT ) ).
ofBirds_ofTypes_text( LIST_BIRD1, LIST_BIRD2, [identificatory|OTHER_TYPE$, THE_TEX
T) :-
    identificatory_sentence( LIST_BIRD1, ID_SENT ),
    ofBirds_ofTypes_text( LIST_BIRD1, LIST_BIRD2, OTHER_TYPE$, REMAINING_TEXT,
        string_concat( ID_SENT, REMAINING_TEXT, THE_TEXT ) ).
ofBirds_ofTypes_text( LIST_BIRD1, LIST_BIRD2, [distribution|OTHER_TYPE$, THE_TEXT]
:-
    distribution_sentence( LIST_BIRD1, DIST_SENT ),
    ofBirds_ofTypes_text( LIST_BIRD1, LIST_BIRD2, OTHER_TYPE$, REMAINING_TEXT,
        string_concat( DIST_SENT, REMAINING_TEXT, THE_TEXT ) ).
ofBirds_ofTypes_text( LIST_BIRD1, LIST_BIRD2, [descriptive|OTHER_TYPE$, THE_TEXT] :
-
    descriptive_sentence( LIST_BIRD1, DESC_SENT ),
    ofBirds_ofTypes_text( LIST_BIRD1, LIST_BIRD2, OTHER_TYPE$, REMAINING_TEXT,
        string_concat( DESC_SENT, REMAINING_TEXT, THE_TEXT ) ).

% For a birdwatcher, we ought to say something about the males and
% females - more often than not one large, one small, one resplendant,
% one gray fluff - but for nonexistent birds we will do nothing of the
% sort

comparative_text( LIST_BIRD1, LIST_BIRD2, THE_TEXT ) :-
    birdList_birdName( LIST_BIRD1, A_NAME ),
    string_upper( A_NAME, A_TITLE ),
    COMP_TEXT_PATTERN = [comparative, identificatory, distribution],
    ofBirds_ofTypes_text( LIST_BIRD1, LIST_BIRD2, COMP_TEXT_PATTERN, COMP_TEXT ),
    '
        strs_flatten( A_TITLE, '\n', COMP_TEXT, '\n \n', THE_TEXT ).

% Don't ask me about existent birds. I own the latest
% edition of the Sibley Guide, but have only used it to
% identify some kind of swallow that was filling up the nearby trees,
% and one common crane. I took a class on animal diversity and we did a
% unit on birds of paradise - their varying calls, the particular
% excesses of their tails and plumage - but I skipped class that week
% and never got around to making up the reading. I did like birds of
% prey when 8 or 9, but mostly because of their speed and killing. But I
% do stop, even when a little late, to stare a moment at a thrush in a
% tree, or to watch a chicken, it's head bouncing up with grubs.

ofBird_ofTypes_text( , [], "" ).

% I did airplanes though - the two engined, the four-engined, the now
% mostly extinct three-engined; the curve of nose telling Airbus from
% Boeing; the presence or absence of winglets

ofBird_ofTypes_text( LIST_BIRD, [identificatory|OTHER_TYPE$, THE_TEXT] :-
    identificatory_sentence( LIST_BIRD, ID_SENT ),
    ofBird_ofTypes_text( LIST_BIRD, OTHER_TYPE$, REMAINING_TEXT,
        string_concat( ID_SENT, REMAINING_TEXT, THE_TEXT ) ).
ofBird_ofTypes_text( LIST_BIRD, [distribution|OTHER_TYPE$, THE_TEXT] :-
    distribution_sentence( LIST_BIRD, DIST_SENT ),
    ofBird_ofTypes_text( LIST_BIRD, OTHER_TYPE$, REMAINING_TEXT,
        string_concat( DIST_SENT, REMAINING_TEXT, THE_TEXT ) ).
ofBird_ofTypes_text( LIST_BIRD, [descriptive|OTHER_TYPE$, THE_TEXT] :-

```

```

    descriptive_sentence(LIST_BIRD,DESC_SENT),
    ofBird ofTypes text(LIST_BIRD,OTHER_TYPE$,REMAINING_TEXT),
    string_concat(DESC_SENT,REMAINING_TEXT,THE_TEXT).

descriptive_text(LISTED_BIRD,THE_TEXT):-
    birdList birdName(LISTED_BIRD,A_NAME),
    string_upper(A_NAME,A_TITLE),
    DESC_TEXT_PATTERN=[descriptive,identificatory,distribution],
    ofBird ofTypes text(LISTED_BIRD,DESC_TEXT_PATTERN,DESC_TEXT),
    strs_flatten([A_TITLE,'\n',DESC_TEXT,'\n \n'],THE_TEXT).

% Caged Bird
% BY MAYA ANGELOU
% A free bird leaps
% on the back of the wind
% and floats downstream
% till the current ends
% and dips his wing
% in the orange sun rays
% and dares to claim the sky.
%
% But a bird that stalks
% down his narrow cage
% can seldom see through
% his bars of rage
% 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.
%
% The free bird thinks of another breeze
% and the trade winds soft through the sighing trees
% and the fat worms waiting on a dawn bright lawn
% and he names the sky his own
%
% 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.

first_bird(BIRD,WORDS):-
    a_birdList(BIRD),
    descriptive_text(BIRD,WORDS).

new_birds(0,WHAT_OLD_BIRD$,RELATED_BIRD$,RELATION_WORDS):-
    maplist(a_relationList,WHAT_OLD_BIRD$,RELATED_BIRD$,

```

```

make pairsRELATED BIRD$WHAT OLD BIRD$RELATED PAIR$,
maplist(comparative textRELATED PAIR$RELATION WORD$).

% 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, 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
% Bbbbbbbbbbbbbbbbbbbb, 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-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...

new_birdsHOW MANY,WHAT OLD BIRD$NEW BIRD$NEW WORD$:-
HOW_MANY > 0,

```

```

numlist(1, HOW MANY NEW NUMBERS$,
maplist(a birdList NEW NUMBERS$ FRESH BIRD$,
maplist(a relationList WHAT OLD BIRD$ RELATED BIRD$,
make pairs RELATED BIRD$ WHAT OLD BIRD$ RELATED PAIR$,
maplist(comparative text RELATED PAIR$ RELATION WORD$,
maplist(descriptive text FRESH BIRD$ FRESH WORD$,
append(FRESH BIRD$ RELATED BIRD$ NEW BIRD$,
append(RELATION WORD$ FRESH WORD$ NEW WORD$).

% Something i think i am particularly troubled by is a sense of
% mechanicity - not so much that I am a mechanical 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 sort of machines - for watching from trees, for flapping and odd
% song - that i might enjoy being.

fibonacci_birds(1, [ [BIRD, WORDS] ], [ [BIRD, WORDS] ] ) :-
    first_bird(BIRD, WORDS).

fibonacci_birds(N, ALL BIRDS WITH WORDS, NEW PAIRS) :-
    N >= 2,
    NMONE is N - 1,
    NMTWO is N - 2,
    fibonacci(NMTWO, FIB NMTWO,
    fibonacci_birds(NMONE, ALL OLD BIRD$ OLD BIRDS WITH WORDS,
    maplist(get head OLD BIRDS WITH WORD$ JUST BIRD$,
    new birds FIB NMTWO JUST BIRD$ NEW BIRD$ NEW WORD$,
    make pairs NEW BIRD$ NEW WORD$ NEW PAIR$,
    append(ALL OLD BIRD$ NEW PAIR$ ALL BIRDS WITH WORDS.

lotsOfBirdWords(N) :-
% "Lightening -
    fibonacci_birds(N, THE BIRDS WORDS),
% Heron's
    maplist(get second THE BIRDS WORDS THE WORDS$,
% cry
    strs_flatten THE WORDS$ LOTS OF WORDS$,
% Stabs
    writef(LOTS OF WORDS$.
% the
birdWords() :-
% darkness"
    lotsOfBirdWords(7).

% Freebird
% LYNRYD SKYNYRD
%
% If I leave here tomorrow
% Would you still remember me?
% For I must be traveling on now
% 'Cause there's too many places I've got to see.
%
% But if I stayed here with you, girl,
% Things just couldn't be the same.
% 'Cause I'm as free as a bird now,
% And this bird you can not change, oh, oh, oh, oh.
% And this bird you can not change.
% And this bird you can not change.
% Lord knows I can't change.
%
```

```
% Bye, bye, baby, it's been a sweet love, yeah,  
% Though this feeling I can't change.  
% But please don't take it so badly,  
% 'Cause Lord knows I'm to blame.  
%  
% But if I stayed here with you, girl,  
% Things just couldn't be the same.  
% 'Cause I'm as free as a bird now,  
% And this bird you'll never change, oh, oh, oh, oh.  
% And this bird you cannot change.  
% And this bird you cannot change.  
% Lord knows, I can't change.  
% Lord, help me, I can't change.  
%  
% Lord, I can't change.  
% Won't you fly high, free bird, yeah?
```