A Concept uniqueness and granularity

Here, we report statistics about the uniqueness of neuron concepts, as we increase the maximum formula length of our explanations.
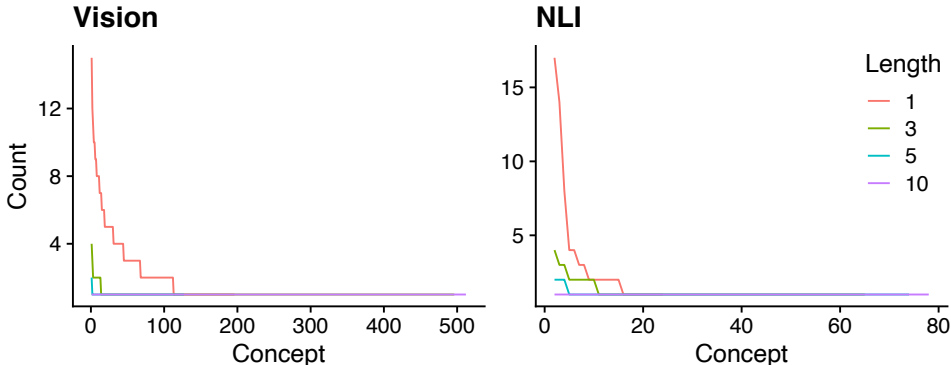

Figure S1: Number of repeated concepts across probed vision and NLI models, by maximum formula length.

Table S1: For probed **Image Classification** and **NLI** models, average number of occurrences of each detected concept and percentage of detected concepts that are unique (i.e. appear only once).

N	Image Classification		NLI	
---	Mean concept count	% unique	Mean concept count	% unique
1	2.61	42%	3.30	39%
3	1.03	97%	1.20	86%
5	1.01	99%	1.04	96%
10	1.00	100%	1.00	100%

A.1 Image Classification

Figure S1 (left) plots the number of times each unique concept appears across the 512 units of ResNet-18 as the maximum formula length increases. Table S1 displays the mean number of occurrences per concept, and percentage of concepts occurring that are unique (i.e. occur only once). At length 1 (equivalent to NetDissect), many concepts appear multiple times, where only 42% of concepts occur only once and the mean number of occurrences is 2.61. But uniqueness increases dramatically as the formula length increases: already by length 3, 97% of concepts are unique, and concepts are all unique by length 10. Our explanations thus reveal significant specialization in neuron function (vs. NetDissect [5]). Table S2 shows the most common repeated concepts for each maximum formula lengths.

A.2 NLI

Similarly, Figure S1 (right) plots the number of times each unique concept appears across the neurons of the NLI model, and Table S1 displays occurrence statistics. Like the Image Classification model, longer formula lengths reveal significantly more specialization in neuron function. Table S3 shows the most common repeated concepts for each maximum formula lengths.
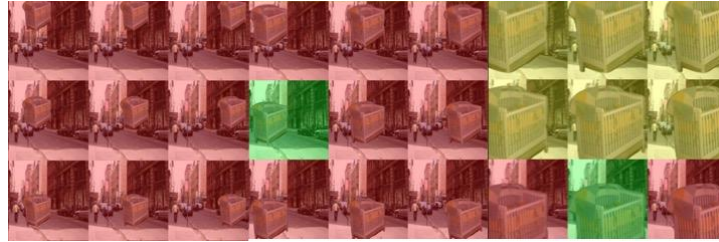
B Adversarial example sensitivity

In Figure S2 we vary the size and position of subimages for the copy-paste examples (note this analysis is less straightforward for examples like *non-blue water*). Sensitivity depends on the specific example. In general, if the sub-image is too small (left), the original class prevails; otherwise, the *igloo → clean room* example is quite reliable, while the *street → fire escape* example is less so.

Table S2: Up to the 10 most repeated concepts in ResNet-18 conv4 by length N. At $N = 5$ there is only 1 non-unique concept. For a full list see the code.

N	Concept	#
1	pool table	15
	house	12
	corridor	11
	cockpit	10
	bed	10
	bakery shop	9
	bathroom	9
	alley	8
	airport terminal	8
	car	8
3	pillow OR (bed AND bedroom)	4
	sink OR toilet OR bathtub	3
	auditorium OR movie theater OR conference center	2
	sink OR toilet OR countertop	2
	pool table OR arcade machine OR slot machine	2
	pool table OR golf course OR fairway	2
	greenhouse OR vegetable garden OR herb garden	2
	water OR river AND (NOT blue)	2
	living room AND (sofa OR cushion)	2
	street AND sky AND white	2
5	auditorium OR indoor theater OR conference center OR movie theater OR silver screen	2

Table S3: Up to 10 of the most repeated concepts in our probed NLI baseline model by length N. At $N = 3$ there are only 9 non-unique concepts; at $N = 5$ there are only 3 non-unique concepts. For a full list see the code.

	NLI	
N	Concept	Count
1	pre:NN	17
	hyp:NN	14
	hyp:IN	8
	overlap-75%	4
	hyp:VBG	4
	hyp:in	3
	hyp:.	3
	hyp:sitting	2
	hyp:DT	2
	hyp:for	2
3	pre:NN AND (NOT overlap-50%) AND (not hyp:outside)	4
	pre:NN AND (NOT hyp:for) AND (NOT hyp:VB)	3
	(NOT hyp:sleeping) AND (pre:NN OR hyp:NNS)	3
	hyp:NN AND (NOT overlap-50%) AND (NOT hyp:outside)	2
	hyp:for OR hyp:PRP$ OR hyp:to	2
	hyp:NN AND (NOT overlap-50%) AND (NOT hyp:there)	2
	pre:NN AND (NOT overlap-75%) AND (NOT hyp:outside)	2
	pre:NN AND (NOT hyp:for) AND (NOT hyp:PRP$)	2
	hyp:eating OR (hyp:IN AND (NOT overlap-50%))	2
5	hyp:NNP OR ((NOT hyp:EX) AND (hyp:IN OR hyp:PRP$ OR hyp:to))	2
	(NOT hyp:for) AND (NOT hyp:PRP) AND (overlap-50% OR (pre:NN AND (NOT hyp:PRP$)))	2
	pre:NN AND (NOT overlap-50%) AND (NOT hyp:outside) AND (NOT hyp:EX) AND (NOT hyp:outdoors)	2

(a) street + cradle = fire escape
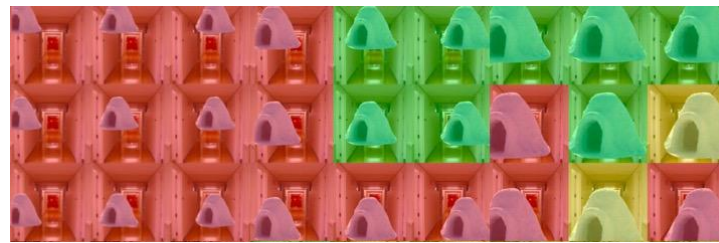
(b) corridor + igloo = clean room

(c) forest path + laundry machines = viaduct

Figure S2: Varying the size and position of pasted sub-images for the vision copy-paste adversarial examples. Green: prediction changes to intended adversarial class; yellow: prediction changes to a different class (e.g. *aqueduct* for the bottom row); red = no change.

C Additional image classification examples

Examples are not cherry picked; we enumerate neurons 0–39.

Unit 0 (lexical and perceptual: bars/surfaces)

Length 1 **IoU** 0.075 reception

Length 3 **IoU** 0.106 ((reception OR work surface) OR bar)

Length 10 **IoU** 0.107 (((((((((reception OR work surface) OR bar) OR ticket counter) OR button panel) AND (NOT desk)) AND (NOT table)) AND (NOT home office)) AND (NOT bottle)) AND (NOT drawer))
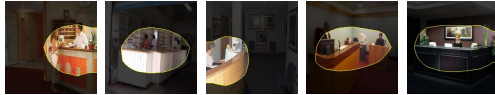
Unit 1 (lexical and perceptual: windows/shelves)

Length 1 **IoU** 0.045 shop window

Length 3 **IoU** 0.084 ((shop window OR pantry) OR liquor store outdoor)

Length 10 **IoU** 0.103 (((((((((shop window OR pantry) OR liquor store outdoor) OR shopfront) OR toyshop) OR gift shop) OR convenience store outdoor) OR pub outdoor) OR trade name) OR shoe shop)

Unit 2 (lexical and perceptual: islands/grass/water)

Length 1 **IoU** 0.063 sea

Length 3 **IoU** 0.078 ((sea OR marsh) OR lake)

Length 10 **IoU** 0.090 (((((((((sea OR marsh) OR lake) OR island) AND (NOT ocean)) OR bayou) OR golf course) AND (NOT tree)) OR bog) OR watering hole)
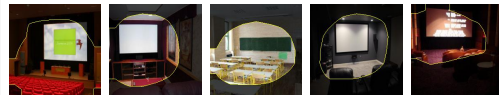

Unit 3 (lexical and perceptual: screens)

Length 1 **IoU** 0.094 auditorium

Length 3 **IoU** 0.177 ((auditorium OR movie theater indoor) OR theater indoor procenium)

Length 10 **IoU** 0.230 (((((((((auditorium OR movie theater indoor) OR theater indoor procenium) OR silver screen) OR conference center) AND (NOT ceiling)) OR blackboard) AND (NOT floor)) OR lecture room) AND (NOT ceiling))

Unit 4 (polysemantic: columns/chandeliers)

Length 1 **IoU** 0.025 courthouse

Length 3 **IoU** 0.049 ((courthouse OR throne room) OR ballroom)

Length 10 **IoU** 0.064 (((((((((courthouse OR throne room) OR chandelier) OR column) OR ballroom) OR bandstand) OR embassy) AND (NOT living room)) AND (NOT poolroom home)) AND (NOT courtroom))
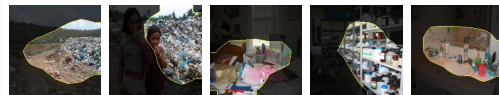

Unit 5 (perceptual only: debris)

Length 1 **IoU** 0.033 shelf

Length 3 **IoU** 0.062 ((slum OR toilet) OR pantry)

Length 10 **IoU** 0.074 (((((((((slum OR toilet) OR pantry) OR rubbish) OR bazaar outdoor) OR bucket) OR washer) OR plaything) OR workshop) AND (NOT market outdoor))

Unit 6 (lexical and perceptual: domes)

Length 1 **IoU** 0.049 gazebo exterior

Length 3 **IoU** 0.073 ((gazebo exterior OR tent) OR dome)

Length 10 **IoU** 0.098 (((((((((gazebo exterior OR tent) OR dome) OR big top) OR hut) OR island) OR butte) OR mausoleum) OR greenhouse) OR bandstand)

Unit 7 (lexical and perceptual: fields of plants)

Length 1 **IoU** 0.057 vineyard

Length 3 **IoU** 0.127 ((vineyard OR orchard) OR corn field)

Length 10 **IoU** 0.133 ((((vineyard OR orchard) OR corn field) OR vineyard) AND (NOT hedge))

Unit 8 (lexical and perceptual: plants)

Length 1 **IoU** 0.098 greenhouse indoor

Length 3 **IoU** 0.130 ((greenhouse indoor OR greenhouse) OR vegetable garden)

Length 10 **IoU** 0.156 (((((((((greenhouse indoor OR greenhouse) OR vegetable garden) OR vineyard) OR leaves) OR florist shop indoor) OR corn field) OR leaf) AND (NOT field)) OR vegetable garden)

Unit 9 (polysemantic: grass/balls/other)

Length 1 **IoU** 0.037 grass

Length 3 **IoU** 0.050 ((ball pit OR plaything) OR kindergarden classroom)

Length 10 **IoU** 0.053 (((((((((ball pit OR plaything) OR kindergarden classroom) OR fruit) OR day care center) OR lake artificial) AND (NOT water)) AND (NOT painting)) AND (NOT pedestal)) AND (NOT fence))

Unit 10 (polysemantic: mountains/highway)

Length 1 **IoU** 0.065 highway

Length 3 **IoU** 0.088 ((highway OR field cultivated) AND (NOT sky))

Length 10 **IoU** 0.092 (((((((((highway OR field cultivated) AND (NOT sky)) OR wheat field) OR desertand) AND (NOT sky)) OR field road) AND (NOT sky)) OR mountain road) AND (NOT earth))

Unit 11 (polysemantic: people/others)

Length 1 **IoU** 0.072 person

Length 3 **IoU** 0.077 ((person OR booth indoor) AND (NOT art studio))

Length 10 **IoU** 0.078 (((((((((person AND (NOT pink)) OR booth indoor) AND (NOT art studio)) AND (NOT head)) OR market indoor) OR booth indoor) OR torso) AND (NOT conference center)) AND (NOT fire station))

Unit 12 (polysemantic: dining rooms/fire escapes/others)

Length 1 **IoU** 0.042 dining room

Length 3 **IoU** 0.072 ((dining room AND table) OR fire escape)

Length 10 **IoU** 0.085 (((((((((dining room AND table) OR fire escape) OR catacomb) OR shelter) OR throne room) OR altar) OR altarpiece) OR fire escape) AND (NOT chair))

Unit 13 (polysemantic: islands/canopies/others)

Length 1 **IoU** 0.035 islet

Length 3 **IoU** 0.070 ((islet OR cavern indoor) OR canopy)

Length 10 **IoU** 0.089 (((((((((islet OR cavern indoor) OR canopy) OR rope bridge) OR carousel) OR catacomb) OR bedchamber) OR altarpiece) OR niche) OR bayou)

Unit 14 (perceptual only: fences/horizontal lines)

Length 1 **IoU** 0.038 boxing ring

Length 3 **IoU** 0.061 ((boxing ring OR corral) OR bleachers indoor)

Length 10 **IoU** 0.081 (((((((((boxing ring OR corral) OR bleachers indoor) OR fence) OR military hut) OR wrestling ring indoor) OR bakery kitchen) OR barnyard) OR parking garage outdoor) OR horse)

Unit 15 (perceptual only: beds)

Length 1 **IoU** 0.062 operating room

Length 3 **IoU** 0.104 ((operating room OR hospital room) OR cradle)

Length 10 **IoU** 0.105 (((((((((operating room OR hospital room) OR cradle) OR dentists office) AND (NOT sink)) AND (NOT chest of drawers)) OR operating room) AND (NOT drawer)) AND (NOT footboard))

Unit 16 (polysemantic: gyms/windmills/other)

Length 1   **IoU** 0.031   ice skating rink indoor

Length 3   **IoU** 0.064   ((ice skating rink indoor OR basketball court indoor) OR martial arts gym)

Length 10   **IoU** 0.112   (((((((((ice skating rink indoor OR basketball court indoor) OR martial arts gym) OR windmill) OR hangar indoor) OR boxing ring) OR wrestling ring indoor) OR fire escape) OR badminton court indoor) OR subway station corridor)
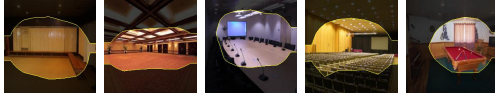

Unit 17 (perceptual only: flat areas)

Length 1   **IoU** 0.068   auditorium

Length 3   **IoU** 0.101   ((auditorium OR conference center) OR movie theater indoor)

Length 10   **IoU** 0.112   (((((((((auditorium OR conference center) OR movie theater indoor) OR theater indoor procenium) OR silver screen) OR courtroom) AND (NOT bench)) AND (NOT pedestal)) OR auditorium) AND (NOT swivel chair))

Unit 18 (polysemantic: rocks/forests/other)

Length 1   **IoU** 0.047   badlands

Length 3   **IoU** 0.072   ((badlands OR forest needleleaf) OR slot machine)

Length 10   **IoU** 0.081   (((((((((badlands OR forest needleleaf) OR slot machine) OR junkyard) OR arcade machine) OR cow) OR semidesert ground) OR animal) OR car interior backseat) AND (NOT green))

Unit 19 (lexical and perceptual: cases)

Length 1   **IoU** 0.144   bakeryhop

Length 3   **IoU** 0.173   ((bakeryhop OR case) AND (NOT supermarket))

Length 10   **IoU** 0.188   (((((((((bakeryhop OR case) OR food) AND (NOT supermarket)) OR bakery kitchen) OR butchers shop) OR ice cream parlor) OR island) AND (NOT kitchen)) AND (NOT cabinet))

Unit 20 (lexical and perceptual: houses/decks)

Length 1   **IoU** 0.036   house

Length 3   **IoU** 0.044   ((house OR motel) OR zen garden)

Length 10   **IoU** 0.049   (((((((((house OR motel) OR zen garden) OR hunting lodge outdoor) OR lido deck outdoor) AND (NOT house)) OR student residence) OR swimming pool indoor) OR barnyard) AND (NOT barn))

Unit 21 (polysemantic: bookcases/fire stations)

Length 1   **IoU** 0.063   bookcase

Length 3   **IoU** 0.098   ((bookcase OR fire station) OR book)

Length 10   **IoU** 0.116   (((((((((bookcase OR fire station) OR book) OR videostore) OR garage door) OR library indoor) AND (NOT archive)) OR videos) OR convenience store indoor) OR exhibitor)

Unit 22 (lexical and perceptual: bridges, possibly over water)

Length 1   **IoU** 0.035   river

Length 3   **IoU** 0.066   ((river OR bridge) OR rope bridge)

Length 10   **IoU** 0.080   (((((((((river OR bridge) OR rope bridge) OR creek) OR mountain path) OR aqueduct) OR gulch) OR sandbar) OR footbridge) AND (NOT canal natural))

Unit 23 (perceptual only: vertical/perspective lines)

Length 1   **IoU** 0.046   kitchen

Length 3   **IoU** 0.058   ((youth hostel OR stove) OR galley)

Length 10   **IoU** 0.070   (((((((((youth hostel OR stove) OR galley) OR microwave) OR work surface) OR telephone booth) OR cubicle office) OR kitchenette) OR exhaust hood) AND (NOT drawer))

Unit 24 (polysemantic: beds/fireplaces/other)
Length 1   **IoU** 0.053   fireplace
Length 3   **IoU** 0.058   ((fireplace OR buffet) OR pulpit)

Length 10 **IoU** 0.060   (((((((((fireplace OR buffet) OR
pulpit) OR microwave) AND (NOT poolroom home)) AND (NOT
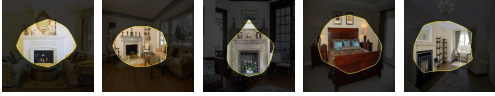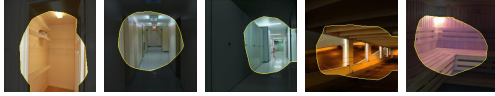wet bar)) AND (NOT pane)) AND (NOT dinette home)) AND
(NOT church indoor)) OR microwave)

Unit 25 (perceptual only: empty corridors)
Length 1   **IoU** 0.067   corridor
Length 3   **IoU** 0.083   ((corridor OR sauna) OR elevator)

Length 10 **IoU** 0.087   (((((((((corridor OR sauna) OR
elevator) OR basement) OR fire escape) OR elevator door)
OR cargo container interior) OR elevator freight
elevator) AND (NOT door frame)) OR corridor)

Unit 26 (lexical and perceptual: aqueducts)
Length 1   **IoU** 0.042   aqueduct
Length 3   **IoU** 0.079   ((aqueduct OR viaduct) OR cloister
indoor)

Length 10 **IoU** 0.097   (((((((((aqueduct OR viaduct) OR
cloister indoor) OR bandstand) OR arch) OR aqueduct) OR
viaduct) OR water tower) OR arcade) OR arcades)

Unit 27 (perceptual only: dome-like things)
Length 1   **IoU** 0.032   cockpit
Length 3   **IoU** 0.054   ((cockpit OR wave) OR viaduct)

Length 10 **IoU** 0.066   (((((((((cockpit OR wave) OR viaduct)
OR hovel) OR tent) OR dam) OR fountain) OR ice) OR
dolmen) OR viaduct)
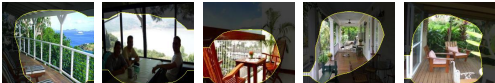
Unit 28 (lexical and perceptual: mediterranean houses)
Length 1   **IoU** 0.045   alley
Length 3   **IoU** 0.081   ((medina OR kasbah) OR alley)

Length 10 **IoU** 0.092   ((((((medina OR kasbah) OR alley) AND
building) OR kasbah) OR medina) AND (NOT railing))

Unit 29 (lexical and perceptual: house facades)
Length 1   **IoU** 0.088   house
Length 3   **IoU** 0.092   ((house OR porch) OR town house)

Length 10 **IoU** 0.093   ((((((((((house AND (NOT building
facade)) OR porch) OR town house) OR inn outdoor) AND
(NOT plant)) AND (NOT alley)) AND (NOT dacha)) AND (NOT
stairs)) AND (NOT general store outdoor))

Unit 30 (lexical and perceptual: porches)
Length 1   **IoU** 0.075   balcony interior
Length 3   **IoU** 0.088   ((balcony interior OR dinette home)
OR control tower indoor)

Length 10 **IoU** 0.089   ((((((balcony interior OR dinette
home) OR control tower indoor) AND (NOT door)) AND (NOT
curtain)) AND (NOT armchair))

Unit 31 (polysemantic: pool tables/others)
Length 1   **IoU** 0.106   pool table
Length 3   **IoU** 0.124   ((pool table OR arcade machine) OR
television camera)

Length 10 **IoU** 0.126   ((((((pool table OR arcade machine)
OR television camera) OR table tennis) AND (NOT
television studio)) AND (NOT wet bar)) AND (NOT music
studio))

Unit 32 (perceptual only: red things)

Length 1 **IoU** 0.045 `red`

Length 3 **IoU** 0.058 `((fire station OR bullring) OR boxing ring)`

Length 10 **IoU** 0.069 `(((((((((fire station OR bullring) OR boxing ring) OR throne room) OR telephone booth) OR big top) OR ring) OR joss house) OR autobus) AND (NOT grandstand))`

Unit 33 (lexical and perceptual: landscapes/horizons)

Length 1 **IoU** 0.078 `badlands`

Length 3 **IoU** 0.116 `((badlands OR desertand) OR oasis)`

Length 10 **IoU** 0.132 `((((((((((badlands OR desertand) OR oasis) OR hoodoo) OR bulldozer) OR canyon) OR dam) AND (NOT rock)) OR badlands) AND (NOT tree))`

Unit 34 (polysemantic: beds and shelves)

Length 1 **IoU** 0.028 `bed`

Length 3 **IoU** 0.032 `((childs room OR dorm room) OR youth hostel)`

Length 10 **IoU** 0.034 `(((((((((childs room OR dorm room) OR youth hostel) OR cushion) OR pantry) OR pillow) AND (NOT wardrobe)) AND (NOT door)) AND (NOT carpet)) AND (NOT attic))`

Unit 35 (polysemantic: water/other structures)

Length 1 **IoU** 0.019 `beach`

Length 3 **IoU** 0.029 `((beach OR tent) OR caravan)`

Length 10 **IoU** 0.039 `(((((((((beach OR tent) OR caravan) OR hovel) OR bayou) OR manufactured home) OR watering hole) OR oasis) OR excavation) OR junkyard)`

Unit 36 (perceptual only: complex white structures)

Length 1 **IoU** 0.041 `boat`

Length 3 **IoU** 0.062 `((boat OR ship) OR aircraft carrier)`

Length 10 **IoU** 0.082 `(((((((((boat OR ship) OR aircraft carrier) OR lighthouse) OR cannon) OR workshop) OR pier) OR roller coaster) OR water tower) OR dam)`
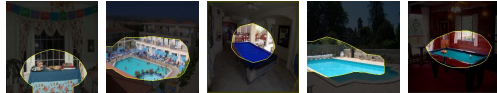
Unit 37 (perceptual only: empty halls/rooms)

Length 1 **IoU** 0.030 `corridor`

Length 3 **IoU** 0.049 `((airplane cabin OR subway interior) OR berth)`

Length 10 **IoU** 0.062 `(((((((((airplane cabin OR subway interior) OR berth) OR operating room) OR hospital room) OR gymnasium indoor) OR swivel chair) AND (NOT conference room)) OR pilothouse indoor) AND (NOT desk))`

Unit 38 (perceptual only: things on grass)

Length 1 **IoU** 0.034 `lighthouse`

Length 3 **IoU** 0.060 `((lighthouse OR bullring) OR batters box)`

Length 10 **IoU** 0.076 `(((((((((lighthouse OR bullring) OR batters box) OR fairway) OR water tower) OR plane) OR pitch) OR baseball field) AND (NOT sky)) OR lighthouse)`

Unit 39 (perceptual only: flat surfaces)

Length 1 **IoU** 0.038 `bed`

Length 3 **IoU** 0.048 `((pool table OR pillow) OR swimming pool)`

Length 10 **IoU** 0.054 `(((((((((pool table OR pillow) OR swimming pool) OR cushion) OR hotel outdoor) AND (NOT black)) AND (NOT swimming pool indoor)) OR eiderdown) AND (NOT black)) OR pillow)`

D   Additional NLI examples

Examples are not cherry picked; we enumerate the first 25 neurons that fire reliably (i.e. at least 500 times across the validation dataset), skipping those already illustrated in the main paper.

Unit 0

`(((((NOT overlap-50%) AND pre:NN) AND (NOT hyp:VB)) AND (NOT hyp:outside)) AND (NOT hyp:near))`

IoU **0.355** w_{entail} -0.027 $w_{neutral}$ -0.018 w_{contra} 0.027

Pre	a woman dressed in a blue long - sleeved shirt and wearing a hairnet .
Hyp	the woman is naked and alone in the bathroom .

Act **43.58** True **contra** Pred **contra**

Pre	two men are on a cherry picker proceeding to perform work at a construction site .
Hyp	two men driving in a truck down an empty highway .

Act **42.50** True **contra** Pred **contra**

Pre	these two poodles , one black and one brown , are playing .
Hyp	the cats are brown and red .

Act **41.24** True **contra** Pred **contra**

Unit 6

`((((((NOT overlap-25%) AND pre:NN) AND (NOT hyp:people)) AND (NOT hyp:EX)) OR hyp:tall)`

IoU **0.239** w_{entail} -0.063 $w_{neutral}$ 0.022 w_{contra} 0.009

Pre	a man in a blue helmet jumping off of a hill on a dirt bike .
Hyp	the man is a professional athlete .

Act **26.31** True **neutral** Pred **neutral**

Pre	a man standing in front of a class of asian students holding a picture of santa claus .
Hyp	a tall human standing

Act **26.02** True **neutral** Pred **neutral**

Pre	a girl prepares herself for the swim meet .
Hyp	the girl has swam before .

Act **25.25** True **entail** Pred **neutral**

Unit 8

`(((((hyp:for OR hyp:to) OR hyp:tall) OR hyp:their) AND (NOT hyp:next))`

IoU **0.247** w_{entail} -0.015 $w_{neutral}$ 0.023 w_{contra} 0.000

Pre	a man is doing tricks on a skateboard .
Hyp	a tall human doing tricks

Act **29.89** True **neutral** Pred **neutral**

Pre	a guy on inline skates with a white hat is on a yellow rail .
Hyp	the guy on inline skates is trying to impress his girlfriend .

Act **26.10** True **neutral** Pred **neutral**

Pre	a gentleman in a striped shirt gesturing with a stick - like object in his hand while passersby stare at him .
Hyp	a gentleman in a striped shirt joyously gesturing

Act **24.58** True **neutral** Pred **neutral**

Unit 16

`((((((NOT hyp:wearing) AND pre:NN) AND (NOT hyp:sleeping)) AND (NOT hyp:sitting)) AND (NOT hyp:eating))`

IoU **0.387** w_{entail} 0.022 $w_{neutral}$ 0.010 w_{contra} -0.042

Pre	a woman wearing a red scarf raises her hand as she walks in a parade .
Hyp	a woman raises her hand as she walks in a parade for st. patrick 's day .

Act **32.96** True **neutral** Pred **neutral**

Pre	a guy on inline skates with a white hat is on a yellow rail .
Hyp	the guy on inline skates is trying to impress his girlfriend .

Act **29.88** True **neutral** Pred **neutral**

Pre	three men ; one pedaling while playing drums , one playing piano and one both pedaling and steering , move a type of mobile band down a street .
Hyp	three men are trying to attract a crowd and take them to a bar where they will be playing later

Act **28.13** True **neutral** Pred **neutral**

Unit 70

`(((((hyp:in OR hyp:nobody) OR hyp:sitting) AND (NOT overlap-75%)) OR hyp:cat)`

IoU **0.164** w_{entail} -0.095 $w_{neutral}$ -0.019 w_{contra} 0.051

Pre	many people have painted faces at night .
Hyp	the people are swimming in the ocean at noon .

Act **39.61**   True **contra**   Pred **contra**

Pre	a man is carrying a child while holding a red and blue umbrella .
Hyp	a man is swimming laps in a pool .

Act **39.46**   True **contra**   Pred **contra**

Pre	a man with a mustache is playing ice hockey with snow in the background .
Hyp	people are swimming in the lake .

Act **38.12**   True **contra**   Pred **contra**

Unit 71

`(((((NOT hyp:to) AND pre:NN) AND (NOT hyp:for)) AND (NOT overlap-75%)) AND (NOT hyp:outdoors))`

IoU **0.366** w_{entail} 0.005 $w_{neutral}$ -0.049 w_{contra} 0.022

Pre	a young man smiles and points at something off - camera , while standing in front of a display .
Hyp	the young man is frowning with his hands in his pockets .

Act **37.08**   True **contra**   Pred **contra**

Pre	a little boy in a blue shirt holding a toy .
Hyp	boy dressed in red lighting things on fire .

Act **36.44**   True **contra**   Pred **contra**

Pre	a shepherd breed dog running on the beach
Hyp	a dog is at home sleeping

Act **36.19**   True **contra**   Pred **contra**

Unit 89

`(((((NOT overlap-50%) AND pre:NN) AND (NOT pre:for)) AND (NOT hyp:sitting)) AND (NOT hyp:wearing))`

IoU **0.251** w_{entail} -0.054 $w_{neutral}$ 0.015 w_{contra} 0.024

Pre	a little girl with a hat sits between a woman 's feet in the sand in front of a pair of colorful tents .
Hyp	the girl is related to the woman .

Act **33.38**   True **neutral**   Pred **neutral**

Pre	two girls are sitting outside on the ground in front of a lake .
Hyp	two girls waiting for butterflies

Act **30.10**   True **neutral**   Pred **neutral**

Pre	three hockey players are in the middle of a play .
Hyp	the players are playing for the championship

Act **27.38**   True **neutral**   Pred **neutral**

Unit 98

`((((NOT overlap-50%) AND (hyp:in OR hyp:running)) OR hyp:swimming) OR hyp:riding)`

IoU **0.127** w_{entail} -0.099 $w_{neutral}$ -0.035 w_{contra} 0.061

Pre	a woman , wearing a dress , while sitting down playing a musical instrument and singing into a microphone .
Hyp	the woman is swimming in the middle of the ocean by herself .

Act **35.66**   True **contra**   Pred **contra**

Pre	a man with a mustache is playing ice hockey with snow in the background .
Hyp	people are swimming in the lake .

Act **35.56**   True **contra**   Pred **contra**

Pre	people walking through dirt .
Hyp	people are swimming .

Act **32.38**   True **contra**   Pred **contra**

Unit 128

`(((((NOT overlap-50%) AND hyp:NN) AND (NOT hyp:outside)) OR hyp:sleeping) AND (NOT hyp:near))`

IoU **0.313** w_{entail} -0.035 $w_{neutral}$ 0.001 w_{contra} 0.034

Pre	two men are on a cherry picker proceeding to perform work at a construction site .
Hyp	two men driving in a truck down an empty highway .

Act **46.77**   True **contra**   Pred **contra**

Pre	a woman dressed in a blue long - sleeved shirt and wearing a hairnet .

Hyp   the woman is naked and alone in the bathroom .
Act **44.54** True **contra** Pred **contra**
Pre   a boy in a red shirt and a boy in a yellow shirt are jumping on a trampoline outside .
Hyp   the boys are asleep .
Act **42.99** True **contra** Pred **contra**

Unit 134

`((((NOT pre:blue) AND (hyp:. AND hyp:NN)) AND (NOT hyp:there)) AND (NOT hyp:outside))`
IoU **0.200** w_{entail} -0.055 $w_{neutral}$ 0.009 w_{contra} 0.038

Pre   a man in a red hat and shirt with gray shorts attempts to do the splits .
Hyp   the man has a blue hat .
Act **29.96** True **contra** Pred **contra**

Pre   people walking down a busy city street in the winter .
Hyp   people are running down a busy city street in summer .
Act **28.37** True **contra** Pred **contra**

Pre   police officer and his motorcycle in a crowd of people at a protest .
Hyp   a police officer is riding a unicorn in front of a crowd .
Act **27.77** True **contra** Pred **contra**

Unit 157

`(((((hyp:for OR hyp:to) AND hyp:.) OR hyp:asleep) OR hyp:sad)`
IoU **0.150** w_{entail} -0.032 $w_{neutral}$ 0.026 w_{contra} -0.032

Pre   a pale dog runs down a path .
Hyp   a dog is running towards his owner
Act **21.24** True **neutral** Pred **neutral**

Pre   a man in a black and blue jacket and a white helmet skiing down a hill swiftly .
Hyp   a man goes down the ski hill swiftly because he is an expert .
Act **20.73** True **neutral** Pred **neutral**

Pre   a woman wearing a red scarf raises her hand as she walks in a parade .
Hyp   a woman raises her hand as she walks in a parade for st. patrick 's day .
Act **20.34** True **neutral** Pred **neutral**

Unit 173

`(((((NOT overlap-75%) AND hyp:IN) OR pre:sitting) OR pre:water) AND (NOT hyp:there))`
IoU **0.175** w_{entail} -0.085 $w_{neutral}$ -0.021 w_{contra} 0.035

Pre   a mother and her two children sit down to rest .
Hyp   three people are running around .
Act **31.63** True **contra** Pred **contra**

Pre   a group of people sitting in a grassy area under a pink and white blossoming tree .
Hyp   people are running in a grassy area .
Act **30.69** True **contra** Pred **contra**

Pre   3 people sitting in a boat , rowing in a large body of water surrounded by greenery .
Hyp   the people standing in a train
Act **30.24** True **contra** Pred **contra**

Unit 203

`(((((NOT overlap-50%) AND (hyp:in OR hyp:on)) OR hyp:sleeping) OR hyp:eating)`
IoU **0.167** w_{entail} -0.061 $w_{neutral}$ -0.009 w_{contra} 0.059

Pre   a girl and two boys are playing in water .
Hyp   the children are eating dinner at a restaurant .
Act **37.10** True **contra** Pred **contra**

Pre   while some people look in the barn , others walk on the bridge and some are enjoying cooling off in the water by the beach .
Hyp   the people are going in the barn to see the horse .
Act **34.58** True **neutral** Pred **contra**

Pre   brown dog running through shallow water .
Hyp   a dog is sleeping on a blanket .
Act **33.11** True **contra** Pred **contra**

Unit 257

`((((hyp:their OR overlap-75%) AND hyp:IN) OR hyp:friend) AND hyp:.)`

IoU **0.218** w_{entail} -0.041 $w_{neutral}$ 0.052 w_{contra} 0.003

Pre	a dressed up woman walking next to a store at night .
Hyp	a dressed up woman is walking next to a pharmacy at night .

Act **30.76**   True **neutral**   Pred **neutral**

Pre	a man in a blue shirt , khaki shorts , ball cap and white socks and loafers walking behind a group of people walking down a stone walkway with a water bottle in his left hand .
Hyp	a man in a blue shirt , khaki shorts , ball cap and blue socks and loafers walking behind a group of people walking down a stone walkway with a water bottle in his left hand .

Act **29.69**   True **contra**   Pred **contra**

Pre	a man is standing in coconuts while trying to open one .
Hyp	a sad man is standing in coconuts while trying to open one .

Act **29.24**   True **neutral**   Pred **neutral**

Unit 265

`(((((NOT hyp:PRP$) AND pre:.) AND (NOT hyp:VB)) AND (NOT hyp:PRP)) AND (NOT hyp:in))`

IoU **0.323** w_{entail} 0.028 $w_{neutral}$ -0.003 w_{contra} -0.055

Pre	a youth is kicking a soccer ball in an empty brick area .
Hyp	a human kicking .

Act **35.21**   True **entail**   Pred **entail**

Pre	a band of people playing brass instruments is performing outside .
Hyp	a group of people have instruments .

Act **31.93**   True **entail**   Pred **entail**

Pre	three hikers are hiking in a mountain filled with trees and snow .
Hyp	peopl;e were on grass

Act **31.77**   True **unknown**   Pred **entail**

Unit 270

`(((((NOT overlap-50%) AND hyp:DT) AND (NOT hyp:outside)) AND (NOT hyp:has)) AND (NOT hyp:near))`

IoU **0.315** w_{entail} -0.060 $w_{neutral}$ -0.011 w_{contra} 0.030

Pre	several people prepare their stalls that consist of fish , vegetables and fruits for the public eye .
Hyp	two men sit in a truck

Act **38.74**   True **contra**   Pred **contra**

Pre	outdoors in front of a crowd , a man plays an instrument by blowing into pipes he holds up to his face .
Hyp	a man sitting on the couch reading a book .

Act **34.87**   True **contra**   Pred **contra**

Pre	blurry people walking in the city at night .
Hyp	seven people dancing in a nightclub .

Act **34.41**   True **contra**   Pred **contra**

Unit 280

`(((((NOT hyp:for) AND pre:NN) AND (NOT hyp:VB)) AND (NOT hyp:PRP)) OR overlap-75%)`

IoU **0.420** w_{entail} 0.018 $w_{neutral}$ -0.034 w_{contra} 0.022

Pre	the lady in the red jacket is helping the other lady decide what to buy .
Hyp	there are multiple people present .

Act **30.85**   True **entail**   Pred **entail**

Pre	a sports match is taking place between one team wearing the colors red and white and another team sporting the colors black and blue .
Hyp	the two teams are wearing different colors .

Act **28.93**   True **entail**   Pred **entail**

Pre	two men , one with a camera and another with hair clippers are helping another man in kitchen .
Hyp	three men are pictured

Act **28.62**   True **entail**   Pred **entail**

Unit 283

`(((((NOT pre:and) AND hyp:IN) OR hyp:PRP$) AND hyp:.) OR hyp:VB)`

IoU **0.223** w_{entail} -0.086 $w_{neutral}$ 0.034 w_{contra} 0.010

Pre   a soccer game with multiple males playing .
Hyp   a men 's soccer team winning the world cup .
Act **32.36**   True **neutral**   Pred **neutral**

Pre   a military group in uniform standing together while one of them gets their hat adjusted .
Hyp   a drill instructor is adjusted a students hat before they preform at a funeral .
Act **29.43**   True **neutral**   Pred **neutral**

Pre   a man is navigating a boat .
Hyp   a man is steering a large yacht down the lake .
Act **28.63**   True **neutral**   Pred **neutral**

Unit 284

`(((((NOT hyp:JJ) AND overlap-25%) AND (NOT hyp:PRP$)) AND (NOT hyp:to) OR hyp:people)`

IoU **0.185** w_{entail} 0.033 $w_{neutral}$ 0.022 w_{contra} -0.065

Pre   elegantly dressed in black , a man and woman embrace in dance .
Hyp   two people are dancing .
Act **26.72**   True **entail**   Pred **entail**

Pre   two men on bicycles competing in a race .
Hyp   people are riding bikes .
Act **22.49**   True **entail**   Pred **entail**

Pre   people walking to a special place .
Hyp   people are walking .
Act **21.08**   True **entail**   Pred **entail**

Unit 302

`(((((hyp:for OR hyp:to) OR hyp:home) OR hyp:after) OR hyp:their)`

IoU **0.226** w_{entail} -0.053 $w_{neutral}$ 0.032 w_{contra} 0.004

Pre   toddler walking along path .
Hyp   toddler is walking to his mom
Act **33.80**   True **neutral**   Pred **neutral**

Pre   uniformed schoolgirls are walking together on the street .
Hyp   the girls are walking home from school .
Act **30.83**   True **neutral**   Pred **neutral**

Pre   a pale dog runs down a path .
Hyp   a dog is running towards his owner
Act **28.92**   True **neutral**   Pred **neutral**

Unit 362

`(((((hyp:outdoors OR hyp:outside) OR hyp:near) OR hyp:there) OR hyp:not)`

IoU **0.188** w_{entail} 0.041 $w_{neutral}$ -0.027 w_{contra} -0.062

Pre   man and a woman walking on the street
Hyp   there are at least two people in the picture .
Act **36.00**   True **entail**   Pred **entail**

Pre   three women are sitting on a wharf and kicking their feet in the water .
Hyp   more than one person is touching a liquid .
Act **35.04**   True **entail**   Pred **entail**

Pre   a group of people playing guitars and singing .
Hyp   there are several people in this photo , and they are all making music .
Act **32.35**   True **entail**   Pred **entail**

Unit 375

`(((((hyp:nobody OR overlap-75%) OR hyp:not) OR hyp:no) OR hyp:one)`

IoU **0.201** w_{entail} -0.007 $w_{neutral}$ -0.038 w_{contra} 0.089

Pre   a band which includes an upright bass player is playing in a tent in front of canadian flags .
Hyp   the band has no bass player .

Act **30.21** True **contra** Pred **contra**

Pre   a boy with a concerned look it holding up two newspapers featuring a headline about murder .

Hyp   a boy is not holding anything .

Act **25.75** True **contra** Pred **contra**

Pre   a young boy wearing a red coat eats a chocolate bar .

Hyp   the boy has no clothes on .

Act **20.98** True **contra** Pred **contra**

Unit 382

`(((((NOT hyp:there) AND hyp:NN) AND (NOT hyp:sitting)) AND (NOT hyp:standing)) OR hyp:VB)`

IoU **0.375** w_entail -0.022   w_neutral 0.024   w_contra 0.008

Pre   a group of people wearing hats and using walking sticks are walking through a wooded area on a trail .

Hyp   the tourists are being guided on their trip .

Act **40.71** True **neutral** Pred **neutral**

Pre   a gentleman in a striped shirt gesturing with a stick - like object in his hand while passersby stare at him .

Hyp   a gentleman in a striped shirt joyously gesturing

Act **40.40** True **neutral** Pred **neutral**

Pre   a middle - aged man in a gray t - shirt and brown pants sitting on his bed reading a flyer - like paper .

Hyp   he is reading a flyer about a new job he is interested in .

Act **40.04** True **neutral** Pred **neutral**

Unit 386

`((((hyp:IN AND overlap-75%) OR hyp:not) OR hyp:no) OR hyp:only)`

IoU **0.198** w_entail -0.075   w_neutral 0.014   w_contra 0.060

Pre   a man in a blue shirt , khaki shorts , ball cap and white socks and loafers walking behind a group of people walking down a stone walkway with a water bottle in his left hand .

Hyp   a man in a blue shirt , khaki shorts , ball cap and blue socks and loafers walking behind a group of people walking down a stone walkway with a water bottle in his left hand .

Act **32.64** True **contra** Pred **contra**

Pre   a boy with a concerned look it holding up two newspapers featuring a headline about murder .

Hyp   a boy is not holding anything .

Act **26.37** True **contra** Pred **contra**

Pre   a dressed up woman walking next to a store at night .

Hyp   a dressed up woman is walking next to a pharmacy at night .

Act **25.10** True **neutral** Pred **neutral**

Unit 390

`((((hyp:IN OR hyp:to) OR hyp:PRP$) AND (NOT hyp:EX)) OR hyp:NNP)`

IoU **0.422** w_entail -0.045   w_neutral 0.033   w_contra 0.010

Pre   two women walking in an area of UNK .

Hyp   two UNK workers walk down the street of the once beautiful suburban neighborhood , surveying the damage from the storm .

Act **41.84** True **neutral** Pred **neutral**

Pre   a group of kids are playing on a tire swing .

Hyp   a group of dogs are chasing a duck .

Act **39.84** True **contra** Pred **contra**

Pre   a woman walks by a brick building that 's covered with graffiti .

Hyp   the woman 's son drew some of the graffiti .

Act **37.97** True **neutral** Pred **neutral**