**Introduction**

Here we seek to improve the performance of GPT-3 extracting context by using 4-shot learning. The prompt breaks up the context from “Get\_Bio\_Strat\_2” into an environment, context, and timing. The thought process behind this was that these elements together would encompass every type of context.

**Prompt**

Refer to prompt 6 in the “Context\_prompt\_list” file in this directory.

**Test From OpenAI Playground**

Text: Harbor seal vibrissa morphology suppresses vortex-induced vibrations. Harbor seals (Phoca vitulina) often live in dark and turbid waters, where their mystacial vibrissae, or whiskers, play an important role in orientation. Besides detecting and discriminating objects by direct touch, harbor seals use their whiskers to analyze water movements, for example those generated by prey fish or by conspecifics. Even the weak water movements left behind by objects that have passed by earlier can be sensed and followed accurately (hydrodynamic trail following). While scanning the water for these hydrodynamic signals at a swimming speed in the order of meters per second, the seal keeps its long and flexible whiskers in an abducted position, largely perpendicular to the swimming direction. Remarkably, the whiskers of harbor seals possess a specialized undulated surface structure, the function of which was, up to now, unknown. Here, we show that this structure effectively changes the vortex street behind the whiskers and reduces the vibrations that would otherwise be induced by the shedding of vortices from the whiskers (vortex-induced vibrations). Using force measurements, flow measurements and numerical simulations, we find that the dynamic forces on harbor seal whiskers are, by at least an order of magnitude, lower than those on sea lion (Zalophus californianus) whiskers, which do not share the undulated structure. The results are discussed in the light of pinniped sensory biology and potential biomimetic applications.

Function: to reduce vibrations

Mechanism: undulated surface structure

Timing: while scanning the water

Context: weak water movements

Environment: in the water

Part of: whiskers

Organism: harbor seal

Strategy: Harbor seals reduce vibrations by using their whiskers with an undulated surface structure to scan the water for weak water movements.

**Content**

1. W2005539166
   * "title": "Polarization sensitivity in two species of cuttlefish - Sepia plangon (Gray 1849) and Sepia mestus (Gray 1849) - demonstrated with polarized optomotor stimuli.", "abstract": "the existence of polarization sensitivity (ps), most likely resulting from the orthogonal arrangement of microvilli in photoreceptors, has been proposed in cephalopods for some time, although it has rarely been examined behaviourally. here, we tested the mourning cuttlefish, sepia plangon, and the reaper cuttlefish, sepia mestus, for polarization sensitivity using a large-field optomotor stimulus containing polarization contrast. polaroid filter drums with stripes producing alternating e-vectors were rotated around free-moving animals. polarized optomotor responses were displayed, and these responses were similar to those performed in response to a black-and-white, vertically-striped drum, whereas no responses were displayed to a plain polarizing control drum producing just a vertical e-vector. this indicates that the animals are able to see the contrast between adjacent stripes in the polarizing drum. to our knowledge, this is the first demonstration of functional polarization sensitivity in cuttlefish."
   * Output:
     + Organism: Polarization sensitive cuttlefish
     + Part of: eyes
     + Function: see contrast between adjacent stripes
     + Mechanisms: polaroid filter drums with stripes producing alternating e-vectors
     + Timing: while free-moving
     + Environment:
     + Context: large-field optomotor stimulus containing polarization contrast
     + Strategy: Cuttlefish are able to see the contrast between adjacent stripes in a polarizing environment by using polaroid filter drums with stripes producing alternating e-vectors.
   * Notes
     + Correct
       - Organism, Part Of, Function, Context, Timing
     + Incorrect
       - Mechanism → orthogonal arrangement of microvilli in photoreceptor
       - Strategy → Cuttlefish see the contrast between adjacent stripes by orthogonal arrangement of microvilli in photoreceptor in a large-field optomotor stimulus.
     + 5/8
     + The environment is not found. This is possibly due to the fact that the mechanism and context already abstract the environment.
     + Main Issue
       - GPT-3 confuses the experimental mechanism with the organism mechanism.
       - The mechanism relates to the part of the organism, which could be a factor as well.
2. W2151557512
   * "title": "Identification and characterization of a multidomain hyperthermophilic cellulase from an archaeal enrichment.", "abstract": "archaea are microorganisms that use a wide range of carbon and energy sources. graham et al. describe an archaeal consortium that can grow at temperatures above 90 \u00b0c using crystalline cellulose as a carbon source, with potential applications in enzymatic degradation under extreme conditions."
   * Baseline:
     + Organism: archaeal consortium
     + Part Of: cellulase
     + Function: can grow at high temperatures
     + Mechanism: multidomain hyperthermophilic
     + Context: using crystalline cellulose as a carbon source
     + Strategy: A multidomain hyperthermophilic cellulase from an archaeal enrichment can grow at temperatures above 90 °c using crystalline cellulose as a carbon source.
   * Prev:
     + Organism: archaea
     + Part Of: cellulase
     + Function: can grow at high temperatures
     + Mechanism: using crystalline cellulose
     + Environment: extreme conditions
     + Context: temperatures above 90 °c
     + Strategy: Archaea grow at high temperatures by using crystalline cellulose as a carbon source under extreme conditions.
   * New:
     + Organism: an archaeal consortium
     + Part Of:
     + Function: grow at temperatures above 90 °c
     + Mechanism: using crystalline cellulose
     + Timing:
     + Environment:
     + Context:
     + Strategy: An archaeal consortium can grow at temperatures above 90 °c by using crystalline cellulose as a carbon source.
   * Notes:
     + Baseline
       - Correct
         * Organism, Part Of, Function
       - Incorrect
         * Mechanism, Context, Strategy
       - 3/6
     + Prev
       - Perfect
       - Environment and Context are interchangeable
       - 7/7
     + New
       - Correct
         * Organism, Function, Mechanism, Strategy
       - Incorrect
         * Part Of, Timing, Environment, Context
       - 4/8
     + Issues
       - The main issue is that GPT cannot find the timing, context, environment, or part Of.
       - There could be a couple reasons for this:
         * Timing comes before Context, Environment, and Part Of. If it cannot find timing or there is no timing, making GPT output a blank space, then maybe this effects the other elements as well.
         * These elements were not mentioned in the prompt.
         * There are duplicates in the previous elements, which make GPT not find these elements.
         * The prompt is short.
         * Too complex of a prompt.
3. W2160542693
   * "title": “DIFFERENCES IN POLYSACCHARIDE STRUCTURE BETWEEN CALCIFIED AND UNCALCIFIED SEGMENTS IN THE CORALLINE CALLIARTHRON CHEILOSPORIOIDES (CORALLINALES, RHODOPHYTA) 1", "abstract": "the articulated coralline calliarthron cheilosporioides manza produces segmented fronds composed of calcified segments (intergenicula) separated by uncalcified joints (genicula), which allow fronds to bend and reorient under breaking waves in the wave-swept intertidal zone. genicula are formed when calcified cells decalcify and restructure to create flexible tissue. the present study has identified important differences in the main agaran disaccharidic repeating units [\u21923)-\u03b2-d-galp (1\u2192 4)-\u03b1-l-galp(1\u2192] synthesized by genicular and intergenicular segments. based on chemical and spectroscopical analyses, we report that genicular cells from c. cheilosporioides biosynthesize a highly methoxylated galactan at c-6 position with low levels of branching with xylose side stubs on c-6 of the [\u21923)-\u03b2-d-galp (1\u2192] units, whereas intergenicular segments produce xylogalactans with high levels of xylose and low levels of 6-o-methyl \u03b2-d-gal units. these data suggest that, during genicular development, xylosyl branched, 3-linked \u03b2-d-galp units present in the xylogalactan backbones from intergenicular walls are mostly replaced by 6-o-methyl-d-galactose units. we speculate that this structural shift is a consequence of a putative and specific methoxyl transferase that blocks the xylosylation on c-6 of the 3-linked \u03b2-d-galp units. changes in galactan substitutions may contribute to the distinct mechanical properties of genicula and may lend insight into the calcification process in coralline algae."
   * Prev:
     + Organism: Coralline Calliarthron
     + Part Of: fronds
     + Function: allow fronds to bend and reorient under breaking waves
     + Mechanism: producing segmented fronds composed of calcified segments separated by uncalcified joints
     + Environment: on water
     + Context: in the wave-swept intertidal zone
     + Strategy: Coralline Calliarthron produces segmented fronds composed of calcified segments separated by uncalcified joints to allow fronds to bend and reorient under breaking waves in the wave-swept intertidal zone.
   * New:
     + Organism: Calliarthron
     + Part Of: fronds
     + Function: allow fronds to bend and reorient under breaking waves
     + Mechanism: producing segmented fronds composed of calcified segments separated by uncalcified joints
     + Timing: during genicular development
     + Environment: intertidal zone
     + Context: in the wave-swept intertidal zone
     + Strategy: Coralline Calliarthron produces segmented fronds composed of calcified segments separated by uncalcified joints to allow fronds to bend and reorient under breaking waves in the wave-swept intertidal zone.
   * Notes:
     + Prev
       - 7/7
       - In a perfect world, I would want the function and mechanism to be switched
     + New
       - 8/8
     + Issues
       - None
       - But, observe
         * that each of the elements abstracted are different.
         * The passage is large.
4. W2130285640
   * Sample: "title": "Foam nest components of the t\u00fangara frog: a cocktail of proteins conferring physical and biological resilience", "abstract": "the foam nests of the tungara frog (engystomops pustulosus) form a biocompatible incubation medium for eggs and sperm while resisting considerable environmental and microbiological assault. we have shown that much of this behaviour can be attributed to a cocktail of six proteins, designated ranaspumins (rsn-1 to rsn-6), which predominate in the foam. these fall into two discernable classes based on sequence analysis and biophysical properties. rsn-2, with an amphiphilic amino acid sequence unlike any hitherto reported, exhibits substantial detergent-like surfactant activity necessary for production of foam, yet is harmless to the membranes of eggs and spermatozoa. a further four (rsn-3 to rsn-6) are lectins, three of which are similar to fucolectins found in teleosts but not previously identified in a land vertebrate, though with a carbohydrate binding specificity different from previously described fucolectins. the sixth, rsn-1, is structurally similar to proteinase inhibitors of the cystatin class, but does not itself appear to exhibit any such activity. the nest foam itself, however, does exhibit potent cystatin activity. rsn-encoding genes are transcribed in many tissues of the adult frogs, but the full cocktail is present only in oviduct glands. combinations of lectins and cystatins have known roles in plants and animals for defence against microbial colonization and insect attack. tungara nest foam displays a novel synergy of selected elements of innate defence plus a specialized surfactant protein, comprising a previously unreported strategy for protection of unattended reproductive stages of animals."
   * Baseline:
     + Organism: Túngara frog
     + Part Of: Oviduct glands
     + Function: to form a biocompatible incubation medium for eggs and sperm
     + Mechanism: a cocktail of six proteins
     + Context: while resisting considerable environmental and microbiological assault
     + Strategy: Túngara frogs form a biocompatible incubation medium for eggs and sperm by producing a cocktail of six proteins in their oviduct glands.
   * New:
     + Organism: Túngara frog
     + Part Of: the foam
     + Function: form a biocompatible incubation medium for eggs and sperm while resisting considerable environmental and microbiological assault
     + Mechanism: a cocktail of six proteins, designated ranaspumins (rsn-1 to rsn-6), which predominate in the foam
     + Timing: during reproduction
     + Environment: the oviduct
     + Context: the need for a biocompatible incubation medium
     + Strategy: The túngara frog produces a biocompatible incubation medium for eggs and sperm during reproduction by creating a foam from a cocktail of six proteins, designated ranaspumins (rsn-1 to rsn-6), which predominate in the foam. This strategy protects the eggs and sperm from environmental and microbiological assault.
   * Notes:
     + Baseline
       - Correct
         * Organism, Part Of, Function, Mechanism, Context
         * Strategy is missing information.

context

* + - * 6/6
    - New
      * 8/8

1. W2168114966
   * Sample: "title": "The suctorial organ of the Solifugae (Arachnida, Solifugae)", "abstract": "the ability of members of the arachnid order solifugae to climb smooth, vertical surfaces and the organs involved in this behavior are investigated. macroscopic, microscopic, and scanning electron microscopic observations are made of a palpal organ called the suctorial organ. observations of the behavior but not the microstructure have been made in the past. histological examination illustrates the internal gross anatomy of this structure and scanning electron microscopy demonstrates the fine structure in adults of four genera: eremobates (eremobatidae), eremochelis (eremobatidae), eremorhax (eremobatidae), ammotrechula (ammotrechidae), as well as an unidentified late stage immature and third stage instar. the suctorial organ is most likely primarily used for prey capture in the wild. q 2005 elsevier ltd. all rights reserved."
   * Baseline:
     + Organism: Solifugae
     + Part Of: Suctorial organ
     + Function: prey capture
     + Mechanism: suction
     + Context: in the wild
     + Strategy: Solifugae use suction to capture prey in the wild
   * New:
     + Organism: Solifugae
     + Part Of: Suctorial organ
     + Function: prey capture
     + Mechanism: suction
     + Timing: constant
     + Environment: in the wild
     + Context: smooth, vertical surfaces
     + Strategy: Solifugae capture prey by suctioning onto smooth, vertical surfaces in the wild.
   * Notes:
     + Baseline
       - Correct
         * Organism, Part Of, Function, Mechanism, Context
         * Mechanism is abstracted from suctorial organ
         * Strategy is missing information.

Part Of

* + - * 6/6
    - New
      * 8/8
    - Issue
      * Note, there is no mention of timing in the passage, so GPT abstracts this as “constant”. This is a hallucination for a case we need to address in the prompt

1. W1589686983
   * Sample: "title": "On the Mound of Macrotermes michaelseni as an Organ of Respiratory Gas Exchange", "abstract": "patterns and rates of air movements in the mounds and nests of macrotermes michaelseni were studied using tracer methods. wind is a significant source of energy for powering nest ventilation, despite the mound being a completely enclosed structure. nests are ventilated by a tidal movement of air driven by temporal variation in wind speed and wind direction. density gradients sufficiently steep to drive bulk flow by natural convection will be rare. however, metabolism-induced buoyant forces may interact with wind energy in a way that promotes homeostasis of the mound atmosphere."
   * Baseline:
     + Organism: Macrotermes michaelseni
     + Part Of: Mound
     + Function: Homeostasis of the mound atmosphere
     + Mechanism: Wind energy
     + Context: Temporal variation in wind speed and wind direction
     + Strategy: The mound of Macrotermes michaelseni is an organ of respiratory gas exchange that is powered by wind energy and maintains homeostasis of the mound atmosphere.
   * New:
     + Organism: Macrotermes michaelseni
     + Part Of:
     + Function: Homeostasis of the mound atmosphere
     + Mechanism: Temporal variation in wind speed and wind direction
     + Timing:
     + Environment:
     + Context:
     + Strategy: Macrotermes michaelseni maintains homeostasis of the mound atmosphere by temporal variation in wind speed and wind direction.
   * Notes:
     + Baseline
       - Correct
         * Organism, Part Of, Function, Mechanism, Context
         * Strategy is missing information

Context

* + - * + Also it adds information that is not part of the main elements extracted.
      * 6/6
    - New
      * + Correct

Organism, Function, Mechanism, Strategy

* + - * + Incorrect

Part Of, Timing, Environment, Context

* + - * + 4/8
      * Issues
        + The main issue is that GPT cannot find the timing, context, environment, or part Of.
        + There could be a couple reasons for this:

Timing comes before Context, Environment, and Part Of. If it cannot find timing or there is no timing, making GPT output a blank space, then maybe this effects the other elements as well.

These elements were not mentioned in the prompt.

There are duplicates in the previous elements, which make GPT not find these elements.

The abstract is short.

Too complex of a prompt.

1. W1589686983
   * Sample: "title": "A multi-enzyme cascade of hemoglobin proteolysis in the intestine of blood-feeding hookworms.", "abstract": "blood-feeding pathogens digest hemoglobin (hb) as a source of nutrition, but little is known about this process in multicellular parasites. the intestinal brush border membrane of the canine hookworm, ancylostoma caninum, contains aspartic proteases (apr-1), cysteine proteases (cp-2), and metalloproteases (mep-1), the first of which is known to digest hb. we now show that hb is degraded by a multi-enzyme, synergistic cascade of proteolysis. recombinant apr-1 and cp-2, but not mep-1, digested native hb and denatured globin. mep-1, however, did cleave globin fragments that had undergone prior digestion by apr-1 and cp-2. proteolytic cleavage sites within the hb \u03b1 and \u03b2 chains were determined for the three enzymes, identifying a total of 131 cleavage sites. by scanning synthetic combinatorial peptide libraries with each enzyme, we compared the preferred residues cleaved in the libraries with the known cleavage sites within hb. the semi-ordered pathway of hb digestion described here is surprisingly similar to that used by plasmodium to digest hb and provides a potential mechanism by which these hemoglobinases are efficacious vaccines in animal models of hookworm infection."
   * Baseline:
     + Organism: Hookworm
     + Part Of: brush border membrane
     + Function: digest hemoglobin
     + Mechanism: aspartic proteases, cysteine proteases, and metalloproteases
     + Context: intestinal brush border membrane
     + Strategy: Hookworms digest hemoglobin by using aspartic proteases, cysteine proteases, and metalloproteases in their intestinal brush border membrane.
   * New:
     + Organism: hookworms
     + Part Of:
     + Function: digest hemoglobin
     + Mechanism: proteolytic cleavage
     + Timing:
     + Environment:
     + Context:
     + Strategy: Hookworms digest hemoglobin by proteolytic cleavage during which a total of 131 cleavage sites are identified.
   * Notes:
     + Baseline
     + Correct
       - Organism, Part Of, Function, Mechanism, Strategy is missing info.
     + Incorrect
       - Context → not sure, but could be → blood-feeding pathogens
     + ⅚
     + New
     + Correct
       - * Organism, Function, Mechanism
     + Incorrect
       - * Part Of, Timing, Environment, Context, Strategy
     + 4/8
     + Issues
       - The strategy confuses the experimental mechanism to that of the wild.
       - The main issue is that GPT cannot find the timing, context, environment, or part Of.
       - There could be a couple reasons for this:
         * Timing comes before Context, Environment, and Part Of. If it cannot find timing or there is no timing, making GPT output a blank space, then maybe this effects the other elements as well.
         * These elements may not be mentioned in the prompt.
         * There are duplicates in the previous elements, which make GPT not find these elements.
         * Too complex of a prompt.
2. W2052657884
   * Sample: "title": "The Diversity of Hydrostatic Skeletons", "abstract": "a remarkably diverse group of organisms rely on a hydrostatic skeleton for support, movement, muscular antagonism and the amplification of the force and displacement of muscle contraction. in hydrostatic skeletons, force is transmitted not through rigid skeletal elements but instead by internal pressure. functioning of these systems depends on the fact that they are essentially constant in volume as they consist of relatively incompressible fluids and tissue. contraction of muscle and the resulting decrease in one of the dimensions thus results in an increase in another dimension. by actively (with muscle) or passively (with connective tissue) controlling the various dimensions, a wide array of deformations, movements and changes in stiffness can be created. an amazing range of animals and animal structures rely on this form of skeletal support, including anemones and other polyps, the extremely diverse wormlike invertebrates, the tube feet of echinoderms, mammalian and turtle penises, the feet of burrowing bivalves and snails, and the legs of spiders. in addition, there are structures such as the arms and tentacles of cephalopods, the tongue of mammals and the trunk of the elephant that also rely on hydrostatic skeletal support but lack the fluid-filled cavities that characterize this skeletal type. although we normally consider arthropods to rely on a rigid exoskeleton, a hydrostatic skeleton provides skeletal support immediately following molting and also during the larval stage for many insects. thus, the majority of animals on earth rely on hydrostatic skeletons."
   * Baseline:
     + Organism: anemones, wormlike invertebrates, tube feet of echinoderms, mammalian and turtle penises, feet of burrowing bivalves and snails, legs of spiders
     + Part Of: fluid-filled cavities
     + Function: support, movement, muscular antagonism, and the amplification of the force and displacement of muscle contraction
     + Mechanism: internal pressure
     + Context: animals and animal structures
     + Strategy: animals rely on hydrostatic skeletons for support, movement, muscular antagonism, and the amplification of the force and displacement of muscle contraction by using internal pressure to control the various dimensions
   * New:
     + Organism: animals
     + Part Of: body
     + Function: support, movement, muscular antagonism, and the amplification of the force and displacement of muscle contraction
     + Mechanism: internal pressure
     + Timing: constantly
     + Environment: on earth
     + Context: animals and animal structures
     + Strategy: animals use hydrostatic skeletons to support, move, and provide muscular antagonism by constantly using internal pressure to transmit force throughout their bodies on earth.
   * Notes:
     + Baseline
     + Correct
       - Organism is technically correct, but it should be more general → animals
       - Function
       - Mechanism
       - Part Of is technically Correct, but it should be more general → fluid-filled cavities of the hydrostatic skeleton → hydrostatic skeleton
       - Context
       - Strategy abstracted is good, but it is not consistent with what is abstracted.
     + 6/6
     + New
     + 7/8
     + Part Of → hydrostatic skeleton
     + Issues
       - Does not abstract hydrostatic skeleton
3. W2005779387
   * Sample: "title": "On the buoyancy of the pearly nautilus", "abstract": "nautilus macromphalus sowerby when freshly caught was close to neutral buoyancy having a weight in sea water of about 0\u20132% of its weight in air. the animals without their shells varied considerably in density but the volume of the shell was an approximately constant fraction of the total volume of the whole animal and whole animals were brought approximately to the same density by havingmore or less liquid inside the chambers of the shell. about 80 % of the gas space in the shell was used to support the weight of the shell itself in sea water.in an adult animal the centre of buoyancy was found to be about 6 mm above the centre of gravity, which made the animal very stable in its natural swimming position, a couple of about 350 g. cm being required to turn it through 90\u00b0. the pearly partsof the chamber walls were impermeable to sea water but the chalky and horny siphuncular tubes joining the septal necks were very porous. the most newly formed tenor so chambers were the only ones to contain liquids in appreciable volume and theydid this in diminishing amounts from the newest to the oldest. the watery liquids found within the chambers were always hypotonic to sea water and sometimes markedly so; they contained principally sodium and chloride ions. one animal was in the process of forming a new chamber, this incomplete chamber was completely full of liquidwith an osmolarity close to that of sea water but differing in composition from seawater."
   * Baseline:
     + Organism: pearly nautilus
     + Part Of: shell
     + Function: support the weight of the shell
     + Mechanism: having more or less liquid inside the chambers of the shell
     + Context: in an adult animal
     + Strategy: pearly nautilus support the weight of the shell by having more or less liquid inside the chambers of the shell.
   * New:
     + Organism: the pearly nautilus
     + Part Of: the shell
     + Function: to support the weight of the shell
     + Mechanism: having more or less liquid inside the chambers of the shell
     + Timing: constantly
     + Environment: inside the shell
     + Context: in sea water
     + Strategy: The pearly nautilus constantly has more or less liquid inside the chambers of the shell to support the weight of the shell in sea water.
   * Notes:
     + Baseline
     + Correct
       - Organism, Function, Mechanism, Part Of
       - Strategy is missing information.
         * Context
     + Incorrect
       - Context → was close to neutral buoyancy
     + ⅚
     + New
     + 7/8
     + Timing → when freshly caught
     + Context could also be was close to neutral buoyancy
     + Context and environment should maybe switch
     + Issues
       - GPT cannot find timing, so it makes it up.
4. W2152749757
   * Sample: “title": "How strong is intracanopy leaf plasticity in temperate deciduous trees", "abstract": "intracanopy plasticity in tree leaf form is a major determinant of whole-plant function and potentially of forest understory ecology. however, there exists little systematic information for the full extent of intracanopy plasticity, whether it is linked with height and exposure, or its variation across species. for arboretum-grown trees of six temperate deciduous species averaging 13-18 m in height, we quantified intracanopy plasticity for 11 leaf traits across three canopy locations (basal-interior, basal-exterior, and top). plasticity was pronounced across the canopy, and maximum likelihood analyses indicated that plasticity was primarily linked with irradiance, regardless of height. intracanopy plasticity (the quotient of values for top and basal-interior leaves) was often similar across species and statistically indistinguishable across species for several key traits. at canopy tops, the area of individual leaves was on average 0.5-0.6 times that at basal-interior, stomatal density 1.1-1.5 times higher, sapwood cross-sectional area up to 1.7 times higher, and leaf mass per area 1.5-2.2 times higher; guard cell and stomatal pore lengths were invariant across the canopy. species differed in intracanopy plasticity for the mass of individual leaves, leaf margin dissection, ratio of leaf to sapwood areas, and stomatal pore area per leaf area; plasticity quotients ranged only up to \u22482. across the six species, trait plasticities were uncorrelated and independent of the magnitude of the canopy gradient in irradiance or height and of the species' light requirements for regeneration. this convergence across species indicates general optimization or constraints in development, resulting in a bounded plasticity that improves canopy performance."
   * Baseline:
     + Organism: temperate deciduous trees
     + Part Of: leaf
     + Function: improve canopy performancel
     + Mechanism: plasticity in tree leaf form
     + Context: arboretum-grown trees
     + Strategy: Temperate deciduous trees improve canopy performance by plasticity in tree leaf form.
   * Baseline:
     + Organism: temperate deciduous trees
     + Part Of: leaf
     + Function: improve canopy performance
     + Mechanism: intracanopy plasticity in tree leaf form
     + Timing: across the canopy
     + Environment:arboretum-grown trees
     + Context: a major determinant of whole-plant function
     + Strategy: Temperate deciduous trees improve canopy performance by intracanopy plasticity in tree leaf form across the canopy to solve the problem of a major determinant of whole-plant function.
   * Notes:
     + Baseline
       - Correct
         * Organism, Function, Mechanism, Part Of
         * Strategy is missing information.

Context

* + - * Incorrect
        + Context → whole-plant function and potentially of forest understory ecology
        + Strategy should be if perfect world→ plasticity in tree leaf form improves canopy performance in Temperate deciduous trees.
      * 5/6
    - New
      * 8/8

Kingfisher Example:

Text: Repeated evolution of drag reduction at the air–water interface in diving kingfishers. Piscivorous birds have a unique suite of adaptations to forage under the water. One method aerial birds use to catch fish is the plunge dive, wherein birds dive from a height to overcome drag and buoyancy in the water. The kingfishers are a well-known clade that contains both terrestrially foraging and plunge-diving species, allowing us to test for morphological and per- formance differences between foraging guilds in an evolutionary context. Diving species have narrower bills in the dorsoventral and sagittal plane and longer bills (size-corrected data, n 1⁄4 71 species, p , 0.01 for all). Although these differences are confounded by phylogeny (phylogenetically corrected ANOVA for dorsoventral p1⁄40.26 and length p1⁄40.14), beak width in the sagittal plane remains statistically different ( p , 0.001). We examined the effects of beak morphology on plunge performance by phys- ically simulating dives with three-dimensional printed models of beaks coupled with an accelerometer, and through computational fluid dynamics (CFD). From physically simulated dives of bill models, diving species have lower peak decelerations, and thus enter the water more quickly, than terres- trial and mixed-foraging species (ANOVA p 1⁄4 0.002), and this result remains unaffected by phylogeny (phylogenetically corrected ANOVA p1⁄40.05). CFD analyses confirm these trends in three representative species and indi- cate that the morphology between the beak and head is a key site for reducing drag in aquatic species.

Baseline:

* Organism: kingfishers
* Part Of: beak
* Function: to catch fish (should be reduce drag)
* Mechanism: diving from a height, narrower bills in the dorsoventral and sagittal plane
* Context: in water
* Strategy: Diving kingfishers catch fish by diving from a height and having narrower bills in the dorsoventral and sagittal plane.

New:

* Organism: kingfishers
* Part Of: beak
* Function: to catch fish (should be reduce drag)
* Mechanism: diving from a height
* Timing: when the bird is diving
* Environment: in the water
* Context: piscivorous birds have a unique suite of adaptations to forage under the water
* Strategy: Kingfishers catch fish by plunging into the water from a height to overcome drag and buoyancy. Diving species have narrower bills in the dorsoventral and sagittal plane and longer bills, which allows them to enter the water more quickly and reduce drag.
* Strategy is correct, but the elements of the strategy abstracted are not quite right.

**Conclusion**

Baseline

|  |  | Organism | Part Of | Function | Context | Mechanism | Strategy |  | DocLen |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | W2130285640 | 1 | 1 | 1 | 1 | 1 | 1 | 6/6 |  |
| 2. | W2168114966 | 1 | 1 | 1 | 1 | 1 | 1 | 6/6 |  |
| 3. | W1589686983 | 1 | 1 | 1 | 1 | 1 | 1 | 6/6 |  |
| 4. | W1589686983 | 1 | 1 | 1 | 0 | 1 | 1 | 5/6 |  |
| 5. | W2052657884 | 1 | 1 | 1 | 1 | 1 | 1 | 6/6 |  |
| 6. | W2005779387 | 1 | 1 | 1 | 0 | 1 | 1 | 5/6 |  |
| 7. | W2152749757 | 1 | 1 | 1 | 0 | 1 | 1 | 5/6 |  |
| 8. | W2025490238 | 1 | 0 | 1 | 1 | 1 | 1 | 5/6 |  |
| 9. | W2112209842 | 1 | 1 | 1 | 0 | 1 | 1 | 5/6 |  |
| 10. | W2127657288 | 1 | 1 | 1 | 1 | 1 | 1 | 6/6 |  |
|  |  | 10/10 | 9/10 | 10/10 | 6/10 | 10/10 | 10/10 |  |  |

New Samples tried on New prompt

|  |  | Org. | Part. | Func. | Cont. | Mech. | Tim. | Env. | Strat. |  | DocLen |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | W2130285640 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 5/8 |  |
| 2. | W2151557512 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 4/8 |  |
| 3. | W2160542693 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8/8 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

New

|  |  | Org. | Part. | Func. | Context | Mech. | Tim. | Env. | Strat. |  | DocLen |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | W2130285640 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8/8 |  |
| 2. | W2168114966 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8/8 |  |
| 3. | W1589686983 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 4/8 |  |
| 4. | W1589686983 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 4/8 |  |
| 5. | W2052657884 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 7/8 |  |
| 6. | W2005779387 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 7/8 |  |
| 7. | W2152749757 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8/8 |  |

Final Notes:

* The prompt does horribly on shorter passages, getting a score of 4/8 mostly.
* There could be a couple reasons for this:
  + Timing comes before Context, Environment, and Part Of. If it cannot find timing or there is no timing, making GPT output a blank space, then maybe this effects the other elements as well.
  + ~~These elements were not mentioned in the prompt.~~
  + ~~There are duplicates in the previous elements, which make GPT not find these elements.~~ → GPT has found elements with the same information in them before
  + Too complex of a prompt.
* Also, when there is no timing in the prompt, it often prints “constant”
* I may have to increase the token size to 400 or so
* But, the strategies that are produced correctly, are the best we’ve had