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Engagement for Relevancy: Reception and Signaling. An artistic interpretation of scientific concepts

Engagement pour la pertinence : Réception et signalisation. Une interprétation artistique de concepts scientifiques

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ABSTRACT. Chemical Gradients and thresholds, including hormones and neurotransmitters, are operated with signaling and amplifications. These are often sensed at the cellular level by the largest family of membrane receptors, termed the G-protein coupled receptors (GPCRs), which as it happened also facilitates our sensory inputs. The more famous rhodopsins, light-sensitive GPCRs, which have ancient lineage with bacteria, are found in the imaging tissue of our eyes and in many organisms. Between the extremities lie the capacitance of lifeforms, and of our lives. Is it not the moving averages and ranges that captivates values and challenges for us to behold?

GPCRs stand out as cell-surface proteins that exhibit remarkable specificity toward extracellular ligands and, in some cases, light perception. GPCR signaling, initiated through ligand-receptor interactions, underpins fundamental sensory experiences including vision, taste, and olfaction. Dopamine- and opioid-mediated pathways further contribute to the perception of reward and pain, processes that are harnessed in both analgesic therapies and, conversely, implicated in substance dependence. In this ScienceArt Reciprcate, I celebrate the biology of GPCRs through personal appreciation expressed in two- and three-dimensional artistic interpretations of molecular processes. Engagement marks only the beginning; it is the intricate network of downstream signaling and feedback mechanisms that ultimately confers relevance, adaptability, and meaning within biological systems, much as sustained interactions shape the function and resilience of societal assemblies. This second Science=Art Recipricate was written in more concise style, with poetic connections and ArtingScience between artworks, when compared to 'Whirling in Waters'.

RÉSUMÉ. Les gradients chimiques et les seuils, y compris les hormones et les neurotransmetteurs, sont opérés par signalisation et amplification. Ces phénomènes sont souvent détectés au niveau cellulaire par la plus grande famille de récepteurs membranaires, appelés récepteurs couplés aux protéines G (RCPG), qui, par hasard, facilitent aussi nos stimulations sensorielles. Les plus célèbres, les rhodopsines, sont des RCPG photosensibles ayant une origine ancienne avec des bactéries, se retrouvent dans les tissus visuels de nos yeux et chez de nombreux organismes. Entre les extrêmes se trouve la capacité des êtres vivants, et de nos vies. Ne sont-ce pas les moyennes mobiles et les variations qui captivent les valeurs et nous mettent au défi de les contempler ? Les RCPG se distinguent comme des protéines de surface cellulaire qui présentent une spécificité remarquable envers les ligands extracellulaires et, dans certains cas, la perception de la lumière. La signalisation RCPG, initiée par des interactions ligand-récepteur, sous-tend des expériences sensorielles fondamentales telles que la vision, le goût et l'olfaction. Les voies médiées par la dopamine et les opioïdes contribuent également à la perception de la récompense et de la douleur, des processus exploités à la fois dans les thérapies analgésiques et, inversement, impliqués dans la dépendance aux substances. Dans cet essai ScienceArt, je célèbre la biologie des RCPG à travers une appréciation personnelle exprimée par des interprétations artistiques bidimensionnelles et tridimensionnelles des processus moléculaires. L'engagement ne marque que le début; c'est le réseau complexe de mécanismes de signalisation et de rétroaction en aval qui confère finalement pertinence, adaptabilité et sens au sein des systèmes biologiques, tout comme les interactions soutenues façonnent la fonction et la résilience des assemblages sociaux. Ce second récit Science=Art a été écrit dans un style plus concis, avec des liens poétiques et ArtingScience entre les œuvres, comparé à « Whirling in Waters ».

MOTS-CLÉS. ScienceArts, ArtingScience, tertiary science communications, GPCR.
KEYWORDS. ScienceArts, ArtingScience, communication scientifique tertiaire, GPCR.

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Sparing organisation of space-time,

different receptivity at different times.

Season reverses, senses deepen.

Signalling is the essence of communication,

felt in my stomach and on my bowel,

my mind and my groin, my heart and my whisper,

solemn histories written in engagements.

Pain or happiness, thresholds behold,

distant realms within cells,

receptors joining their pathways,

hierarchical, graded,

alighting upon the sidewalk,

crossing thresholds, seeking directions

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Introduction

GPCRs occupy a distinctive position in biological communication. They detect extracellular ligands directly, yet their influence often extends far beyond the initial site of reception. Their signalling pathways contribute not only to sensory perception, but also to the modulation and interpretation of sensory information. In systems such as opioid signalling, GPCRs can function within neuronal circuits downstream of the primary sensory interface, modulating subsequent stages of information processing. Sensation therefore emerges not from isolated receptors, but from interconnected networks of biological conversations.

Cellular signalling is rarely linear. GPCR pathways intersect with numerous other signalling systems, including kinase cascades such as the MAPK pathway, with its hierarchical sequence of MAP kinase kinase kinases, MAP kinase kinases, and MAP kinases.

Through evolution, cells have developed elaborate and resilient signalling architectures: multiple inputs, hierarchical regulation, pathway crosstalk, activating and inhibitory signals, and positive and negative feedback loops. Together, these features provide living systems with robustness, adaptability, and the capacity to respond differently according to context.

Central to GPCR function are conformational changes within the lipid bilayer. These subtle molecular rearrangements are difficult to observe directly, yet they determine how receptors respond to agonists, antagonists, and other modulators. Hidden from ordinary view, these dynamic transformations echo a broader principle of nature: changes at the smallest and least visible scales can determine outcomes that ultimately become perceptible.



Figure 1. *The Genuine Receptor: Multi-Fold Passage*
one-piece floatwood craft, ~2019 ~50cm in height

Content: a piece of floatwood nodes with branches crafted into five to seven sections, depending from the point of view. Each of the nodes was polished to showcase the interdependent manner. L. and R, Toview. Middle: Sideview

ArtScience:

A conceptual receptor awaiting its ligand.

ArtingScience: what is the binding kinetics affected

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by receptor located membrane boundary water conditions.

Artist inclination

The three faces when two eyes and a nose (or mouth) constitute the minimal face

Zen contemplation: How biased are our senses ?

Seeing and listening give a feeling of reality, as defined by our languages

How different are the founder effects?

Aesthetic Design

Following treatment, the floatwood was refined into a single-branch form. Each node was delicately polished and extensively waxed with clear wax, emphasizing structure and continuity. The eyes and body of the piece were finished with a slightly darker wax, creating depth and contrast while preserving the natural character of the wood. The wood is always difficult to identify after the sea journey but my gut feeling is that it is a piece of oak.

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On Readiness and Passage

Some are guardians of thresholds; some
gather swift quorums.
Some bridge ions, receptor and
signaling side by side.
Attested in impartiality, circuitry for
pleasure and pain,
tuning across relativity, others drawn
toward addiction.

The siliencing of pain, or into addiction,
to shortened circuitry, opioid receptors.
A memory half recalled, awakening with
less,
less of the sickness once borne.
Deep sleep, returning.

Not only from the pineal,
but throughout our cells, melatonin
keeps watch,
tuning nearly half our lives.
Standing by, even beneath a falling sky.

Not my TRP[1] *neighbours alone,*
awakened by the surround sound of the
world.
They speak of differences in sensing,
though their numbered ranks are few
beside the multitude of GPCRs.

Strictly bound in molecular promise,
a flavour, a scent, a scene, a vision.
Combinations of minority verdicts,
inclusions of difference.
Certainty through repeatability,
within the ranges of ordinary
encounters.
In darkness as in light,
layers upon layers of reception.

Requiems of memory abound;
antagonists and inverse agonists,
Waki[2] *is not alone.*

A steadfast constancy,
nano rather than molar,
subtle rather than excessive.
Acetylcholine, adenosine,

histamine H_1*,*
norepinephrine, serotonin,
Incorporating openings and closurs.

Circuitry, plasticity, conductance,
transmitters and receivers of the same
assembly.
Order, order,
arrestin is calling.

Opsins are not only for sight,
dialogue between light and darkness.
melatonin Interpreting moon and sun
is not merely a matter of dating days,
but of narrow windows of hours,
rhythms kept and remembered,
circadian.

There, the spectacle of coral-spawning
peptides,
a synchrony of molecular encounter,
unfolding toward the phenomenal
biodiversity
of reefal worlds.

[1]*TRP channel numbers 28 are far less than the GPCRs ~500 unique gene,*

Excluding for instance thousands of olfactory GPCRs for instance in sensing for slalmon migration).

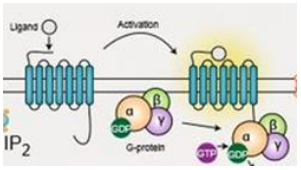
[2] Waki is a drug based in inverse agonist principle of a GPCR

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Figure 2. *Engagement of Relevancy*
(ink & color painting, acrylic paint on paper ~ 60 x 70 cm ~2023)

Content: Distant background sihouttete with season browning color, with abstract branches, and a seeking opend-mouth frog biting the moon, with a conceptual moon goddess. Artistic inclinations:1: hanging tree branches precepted with skyfall, with the legendary moon goddess. There are apparently two time zones with the daytime further ahead in the background but in nighttime in near field, Aesthetic design: the ink-empty blue space contrasted with the autumnic color in acrylic, with textural differences with watercolor. The interludding sihoulettes give a realm of awaiting but sense of dynamic range. In traditional chinese legend, the moon goddess stole the elixir of immortality from her husband and fled to the moon. As divine punishment for her betrayal, her beautiful form withered and transformed into a three-legged, warty Moon Toad. (see GPCR conformational changes with ligand binding)



ArtScience: The G-protein coupled Receptor, ligand bound, superimposed surreally on the moon (G-proteins), with background landscape. A not-too-obvious beast looking from downstream, with open mouth grasping the moon(C). Symbolistic of Ca^{2+} signaling (an often but not exclusive pathway) downstream, and lipid acrylation that anchors the GPCR.αßγ to the membrane. *ArtingScienc*e: Clouds denoting the interlude of membrane flexoelectric properties in the GPCR conformation(Yen et al 2017). *How does the variation amplitude affect αßγ release?*

Upon ligand binding, a GPCR undergoes coordinated conformational rearrangements among its transmembrane helices, creating an intracellular configuration that promotes coupling to heterotrimeric G proteins and activation of downstream signalling pathways. Different G-protein subunits can subsequently regulate distinct effectors. A defining structural transition involves TM6. In the inactive receptor, the cytoplasmic regions of TM3 and TM6 are stabilised by interactions that help maintain the closed conformation. Activation disrupts these constraints, allowing the cytoplasmic end of TM6 to rotate and swing outward. Rearrangements within the receptor core, involving residues such as Ile3.40

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and neighbouring conserved microswitches, transmit the ligand-induced change from the extracellular binding pocket towards the intracellular G-protein interface. Thus, an initially local molecular event becomes amplified into cellular signalling (Latorraca et al., 2017).

Melatonin provides another dimension to this signalling landscape. Best known for its role in coordinating circadian rhythms, melatonin helps align physiology with the daily light-dark cycle, explaining its close association with disturbances such as jet lag. Although historically associated predominantly with secretion from the pineal gland, melatonin is also produced in extrapineal tissues and has broader relationships with cellular metabolism and redox biology. Its actions include receptor-mediated signalling through melatonin GPCRs, particularly MT1 and MT2, as well as receptor-independent interactions. From energy to redox, rhythm becomes a way by which cellular time is organised.



Figure 3. *Visiting is Welcome (Photography)*

ArtScience: Only specific ligand can engage GPCRs, to generate specific downstream signaling pathways. Many GPCRs are recycled to the cell membrane, after binding ligand and perform the programmed signaling (see arrestin biology at the end of the essay)

Photographic Outlook: Turning of both their heads towards the outside visitor, with a synchronized posture of their flip-flops. This is a Hunan village deep in the centre of China, landlocked and without access to port. Many villages, including many parents, will be going to cities for better paid jobs. Many will also stay in the cities.

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Figure 4. *On Olfaction with a Nose-Mouth*
(Floatwood with banacle laiden ~20(L) x14 cm diameter)

The relative positions of eye, nose and mouth is a common face recognition pattern. It is always difficult to depict our nose, only to draw parallel to the elephant truck and the mouth. Olfaction is achieved either through sniffing enviornmental cues (Orthonasal Olfaction)or through aroma (retronasal olfaction). Hence, fragrences and tastes are coupled. Olfactory receptors are embedded directly into the cell membranes of the microscopic hairs (cilia) that project from olfactory sensory neurons in the nose. Every single olfactory sensory neuron in the nose expresses only one specific type of olfactory GPCR. (represented by the inclined angle of standing)(Li et al 2022).(Guo et al 2026). Sniff-crying is when we percept unfair treatment and shout loud for our expectations (see Figure 9)

Olfactory receptions: Deterministic by numbers

Predicted human olfactory receptors illustrate remarkable structural conservation accompanied by subtle molecular variation. Although their overall GPCR architecture is conserved, differences within regions involved in odorant recognition and receptor activation enable a large repertoire of receptors to respond selectively to diverse chemical structures. Through combinatorial receptor activation, these variations contribute to our ability to discriminate among an extraordinary range of odours, from delicate fragrances to pungent smells.

A biomolecule within a cell may seem like a drop in the ocean. Yet it remains a wonder that such a minute encounter can elicit a specific signal, recruit interconnected signalling networks, and modulate cellular physiology, including responses to hormones and the regulation of proliferation. At another biological scale, salmon demonstrate the extraordinary persistence of sensory information. Sensory imprinting begins early in their life history; after migrations extending across vast oceanic distances, olfactory information contributes to their remarkable ability to recognise and return to their natal waters. ArtingScience:*How does the approach rivers evoke the memory recall?*

The structural models shown here represent predicted human odorant receptors in active and inactive conformational states. The database employed both a multi-state modelling protocol and AlphaFold2 to generate models for each receptor and state. Superposition of these structures reveals their shared GPCR architecture alongside receptor-specific structural differences. In the original database visualisation, however, the red-to-blue scale denotes predicted structural confidence (pLDDT), from lower to higher confidence, rather than receptor variability**.**

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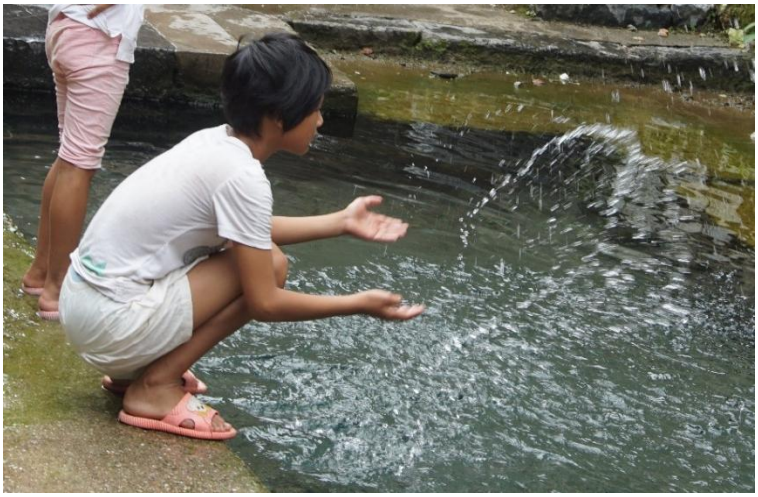


Figure 5. *Resonance on the Pond*
Do we, too, remember the village of our origin?

The splash of water captured in this photograph was taken in a village in Hunan. She is demonstrating to her younger sister: a precisely angled splash that sent ripples resonance back acriss a pond of crystal-clear water.

With solar panels, improved connections to nearby towns, and a growing appreciation of rural landscapes through green tourism, perhaps the direction of migration may also change. Not every journey leads away forever. Some return, drawn back by memory, opportunity, or simply a sense of belonging.

Salmon migration depended on olfactory GPCR to imprint on for recognizing the river of origin; after years at sea with migratory movement receiving guidiance from world magnetic grid (Lohmann & Lohmann 2019). Perhaps memory, too, follows different paths. Some journeys lead outward towards distant oceans; others find their meaning in staying. And some, after travelling far, circle home. Between departure and return, between river and sea, a life unfolds like ripples upon water, widening far beyond the place where it began. There are freshwater-adapted salmon populations that do not perform long-distance migration. Please find molecular biology of salmon migration in theses acadamic literatures(Bett et al 2018, Madsen et al 2019).

ArtSciences: The major essence of G-Protein Coupled Receptor (GPCR) signaling centers on its role as the premier universal translator of human physiology. Comprising the largest family of cell-surface receptors in the human genome (>800 unique receptors), GPCRs cross the plasma membrane exactly seven times. They act as highly dynamic "molecular rheostats," sampling continuous spatial layouts to transform a massive array of external environmental cues into specific, internal cellular behaviors. The fundamental components that define the essence of GPCR signaling can be divergent subtype cascades and broad second messengers in downstream signalling. Many will be amplified whereas some GPCR engagement will be cross posted.(Cho et al 2025) ArtingScience:*How does the approach rivers evoke the memory recall in salmon migration*?

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A raindrop, a drop,
rippling outward,
reflecting silhouettes of sky,
a shy sparing of time.

Echo clouds without thunder.
One drop encountering another,
two marks upon sand,
twins upon the water.

Many falling,
yet no single drop remains.
No shyness of time,
all moments dissolving.

A drop in the ocean,
the sea rises imperceptibly,
listening beneath the stars.

A drop in the ocean,
clouds still journeying,
the moon descending.

A drop in the ocean,
the silence of time sounding,
pendulum's swing.

A grain of sand among dunes,
a drop within the ocean,
stones rolling like distant thunder.

A shy reach,
time rolling on.
So many drops within the ocean

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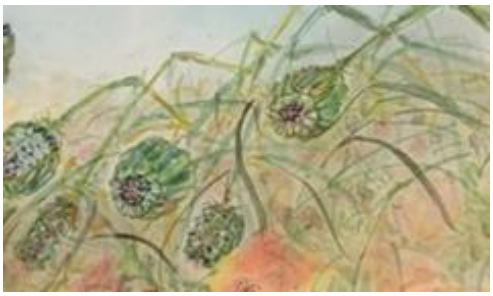


Figure 6. *Senses Within Boundary*
(color painting on paper, ~2022 90x45cm)

Content: A field of poppies amid sun and wind, opioid receptors are part of the GPCR superfamily.

Art Credit http://www.yshk-art.com/pithy-detail-2872.html (the third artist)

ArtScience: Different signaling components exhibit unique dynamics and communication protocols (IP_3, cAMP, Ca^{2+} …).: opioid receptor role in pain perception, rewards circuitry, and drug dependency.



GPCRs are involved in our five primary senses, norciception (pain), hallucinations. upon stimulation, the Gβ-Gγ activates the downstream signaling pathways.

The five senses with the five sensing organs (boxed) the different groupings into two sharing faces with eyes and mouths of inclining organisms. Where is the memory ? without which consciousness has no references. ArtingScience: How are Ca^{2+}store coupling with system dynamics?

Aesthetic design: the contrasting green and red is subtlly disguised with the conecting fruiting bodies and the hidden path, with closer-red to more distant pinkish.

The poppy flower was a symbol of peace (*Flanders Fields*, *John McCrae 1915*) whereas forced Opium trading was the subject of Opium Wars. Through East Indian Compamy, the British Government protected the 'British interests' in illegal opium trade that was forced onto China with superior weapons, resulting in the first (~1840) and second opium war (1859)(Hanes & Sanello 2004).

Opioids are potent analgesics widely used for the management of pain, yet their therapeutic benefits are accompanied by serious risks, including respiratory depression, tolerance, dependence, and addiction(Halpern & Blistein 2019). These adverse effects, together with widespread opioid misuse and overdose, have created an urgent need for safer analgesics and more effective treatments for opioid use disorder. The μ-opioid receptor (MOR), a member of the GPCR family, mediates many of both the therapeutic and adverse effects of opioids. A critical challenge, therefore, is to distinguish the specific cell populations, neural circuits, and downstream signalling mechanisms responsible for analgesia from those contributing to reward, respiratory depression, tolerance, and addiction. Such mechanistic separation may provide opportunities to preserve pain relief while reducing the harmful consequences of opioid exposure.(Ochandarena et al 2023) (Kosten & George 2002).

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Figure 7. *Happiness Apparent with No Perception of Pain*
Ink on paper ~50 x 30 cm

Art inclination: the main figurative head depict a heavily drunk person attempting to view his reflection from his hand.

Despite no color, the person was obviously drunk in a half smile half cry expression, this is one from a serie of expressive figureheads.

Alcohol causes an immediate spike in the neuropeptide GABA, brain's primary inhibitory brake, acting on GABA receptor channel and drops glutamate (the brain's gas pedal) NMDA receptor. Alcohol alters $GABA_B$ signaling to help control the slow, prolonged dampening of central nervous system excitability. Alcohol triggers the release of endogenous opioids (endorphins) and dopamine. These molecules bind directly to mu-opioid and dopamine (D_1–D_5) GPCRs and essentially suppress inhibition and elevate excitation (Valenzuela 1997).

https://www.bohrium.com/en/sciencepedia/feynman/keyword/nmda_and_alcohol

Gating, Through and Uninhibited

Doors for opening, flowing in, closing

Where is the door?

A clearing for a view;

Impermanence per se, neither full nor empty

Door is for through

No-view room, skyclouding

Feeling reached, thorough way, thorough ways

Exit-en-entry, stratus limbus away

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Figure 8. *In Responses and Passages*
(painting on paper, ~2017 ~40 x 85cm)

Content: Two groups of oploid plants connected with wind and serendipitous seed release.

Artistic Inclination:

For Whom The Flower Is For?

For the petals? for the leaves, stalks, roots nor seeds, perhaps for the plant.

Poetically, flowers are probably for the wind, or for the insects, perhaps not for the rain.

"Picking up a flower and smiling"

The Flower Sermon. https://en.wikipedia.org/wiki/Flower_Sermon

Aesthetic design: clockwise from centre potint bright colors transiting to darker colors, the current seasons depended on previous year ‘s rain and snow.

ArtScience: GPCR receiving an agonist, with the release of downstream signaling.

Binding of specific extracellular ligand will activate subcellular responses. When a signaling molecule binds to a GPCR, it triggers a conformational change in the receptor, which in turn activates a G protein. ArtingScience: will the bound ligand be released and activate a second opoid receptor? how much does GPCR insignaling altering holistic signalsome?

Poppies have a remarkable association with disturbed landscapes. Species adapted to open ground can appear where established vegetation has been disrupted, while some have evolved an even more intimate relationship with fire(Leger & Rice 2003). Disturbance therefore becomes an opportunity. Fire removes

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established vegetation and opens the landscape to light; beneath the apparently devastated ground, dormant seeds await the appropriate signal. This gives the poppy an intriguing place within the story of opioids. From the poppy came molecules capable of acting upon receptors already present within the human nervous system, receptors involved in the ancient biological regulation of pain and reward (Halpern & Blistein 2019). The plant and the receptor evolved in separate worlds, yet chemistry brings them into conversation.

Happiness and Pain

A prelude to Expectation + Desire and Addiction.

Per unit effort Happiness, $\underline{E = mc^2}$

Happiness is an absolute relativity,

of our compartive surrounds,

A shorter hour, a higher pay.

Of our experiences.

I lose my memory to get rid of pain.

Forgotten happiness.

I am hungry the next day,

Happy again to have a full stomach.

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Figure 9. *Expectation through Moving Averages*
FloatBamboo Copper Craft 1: Copper pipes fixture with floatbamboo craft, Patina, seeds, wood
~2019 ~50cm in height

Content: a piece of floatbamboo crafted in a piece with two sections. Bend water pipe with balancing seeds to showcase experiences conditioning us with our expectations.

Artist inclination

Expectation for responsive reception

Reception and responses are relative to preconditionings, which in turn is conditioned to our prior experiences. Short circuiting may lead to continuous responses whereas coerced confinement may lead to inability to response. The 'expectation' is weighted by the two large seeds, balancing potential responses with previous experiences (the brass pieces on top) which institute the dropping of the wooden fruit. Pre-conditioning includes some structural forms of the receptors that can be in-responsive or 'constitutively' active, respectivelly inactive even bound with ligand, and functional active without binding ligand.

Aesthetics design: excluding the fruit.

The fruit was hanged via a piece of airy root of banyan tree, pointing to expectations being point of disappontment. the bamboo was also the top piece of the pole, having slightly inward incline at the top through transport. The bamboo piece is heavy, likely a very tall specimen with woodenized cellulose fibres.

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The flow led to expectation (screw fitting along the bent pipe) with the wooden ‘fruit’ hanging in front. Reward and pain circuitries denoted by two turnable knobs of the same seed type (in Chan Buddhism the cause-result). All happiness and disappointments are relative, the healing process concerns turning the knobs

ArtScience: The flow led to expectation (screw fitting along the bent pipe) with the wooden ‘fruit’ hanging in front. Reward and pain circuitries denoted by two turnable knobs of the same seed type (in Chan Buddhism the cause-result). All happiness and disappointments are relative, the healing process concerns with turning the knobs or temporary excluding the fruit.

*We have been ‘**constutively active’** for most of iur working life, going through expectations of **moving averages** in the society we are engaged in.*

GPCR signalling depends on precisely coordinated structural transitions between different receptor conformations. Even in the absence of ligand, however, some GPCRs display a degree of basal, or constitutive, activity. Mutations can shift this conformational equilibrium towards the active state, producing constitutively active receptors that continue to signal without agonist stimulation. Such naturally occurring activating mutations have been associated with several human disorder(Tao 2008). A constitutively active GPCR can be imagined as a leaking faucet. Normally, the receptor fluctuates between inactive and active conformations, with an agonist shifting the balance towards activation. A constitutively activating mutation makes the faucet “leak”, allowing signalling to continue even when no ligand is turning the handle. An Inverse Agonist (Khilnani & Khilnani 2011) can be considered a special tool that physically forces the handle past its normal stopping point to completely seal the valve and stop the leak.

In short, while a regular blocker just guards the switch, an inverse agonist actively turns off a receptor that is running out of control on its own.

Examples of diseases attibutable to constitutively active GPCRs,

Natural or acquired mutations can lock a GPCR into an active state, driving uncontrolled signaling that causes genetic and somatic human disorders [1]. For instances,

Rhodopsin: Specific mutations cause autosomal dominant retinitis pigmentosa (ADRP) or congenital stationary night blindness. [1] (https://pmc.ncbi.nlm.nih.gov/articles/PMC2668812/)

(https://pmc.ncbi.nlm.nih.gov/articles/PMC2668812/), [2] (https://pmc.ncbi.nlm.nih.gov/articles/PMC1572052/)

Whereas **inverse agonist** drug examples include

Cetirizine (Zyrtec) ;antihistamines(H1) targeting histamine H1 receptor for treating allergies. Metoprolol, a ‘Beta-blocker’ targeting the Beta-1 adrenergic receptor for reducing blood pressure. Primavanserin/Clozapine, atypical antopsychotics targeting the serotonin 5-HT2A receptor for treating pzychiatric conditions.

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Figure 10. *Addiction and Desire*
(floatwood copper-pipe with bivalve shell-laiden rocks craft ~H30 x L24 x W10 inches)

Content and art. A piece of floatwood, banacle laiden, was trimmed to the hand shape. This is reminescience of the story in which the 'monkey king' made a long-distance sky-swing, only to find himself to be within the Buddha hand. Following from the last artpiece 'expectation', all our feelings are relative to our experience and pre-conditioning. Some consider real and some consider empty, with both states being in themself relative. That did not stop us being over-driven by our desire, sometimes forgotten the beauty of normality. P.T.O. for individual component explanation.

ArtScience: Happiness/reward circuitry is regulated with specific dopamine-associated circuitries. Peripherial pain/Nociception(negative) circuitry came with peripheral nervous system (PNS) in the perception of injuries, affecting stop and repair before proceeding. The pain/nociception PNS connection to the CNS (to spinal cord to brain) can be blocked by opioid receptor-containing circuitry (Mendell 2011) and hence the opiate-mediated analgesia effect.

The sensation of reward typically follows meaningful effort or achievement, producing a feeling of satisfaction that reinforces the behaviours that led to that outcome. Certain drugs, including prescribed opioids, can short-circuit this natural relationship between effort and reward. By directly stimulating neural reward circuits, these agents can evoke feelings of pleasure independent of the underlying accomplishment. Reward and pain pathways are also closely interconnected. Activation of reward circuits can diminish the perception of pain, a phenomenon known as analgesia. Endogenous opioids released during rewarding experiences, as well as exogenously administered opioid drugs, act on overlapping neural networks involved in both reward and nociception.

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Naltrexone, a medication designed specifically as an opioid receptor blocker (https://www.ncbi.nlm.nih.gov/books/NBK534811/), is effective at treating both opioid use disorder and alcohol use disorder; this give additional support of common pathways shared (Huang et al 2019, O'Sullivan & Schwaber 2021).

Aesthetics

The driftwood retains a small population of barnacles, which I took care not to remove during trimming. I preserved as many of the original branches as possible to maintain the natural character of the wood.

The sculpture can be seen simultaneously as a head and as a cupped hand, evoking the episode from Journey to the West in which the Monkey King attempts to leap beyond the Buddha's hand, only to discover that he remains within its grasp

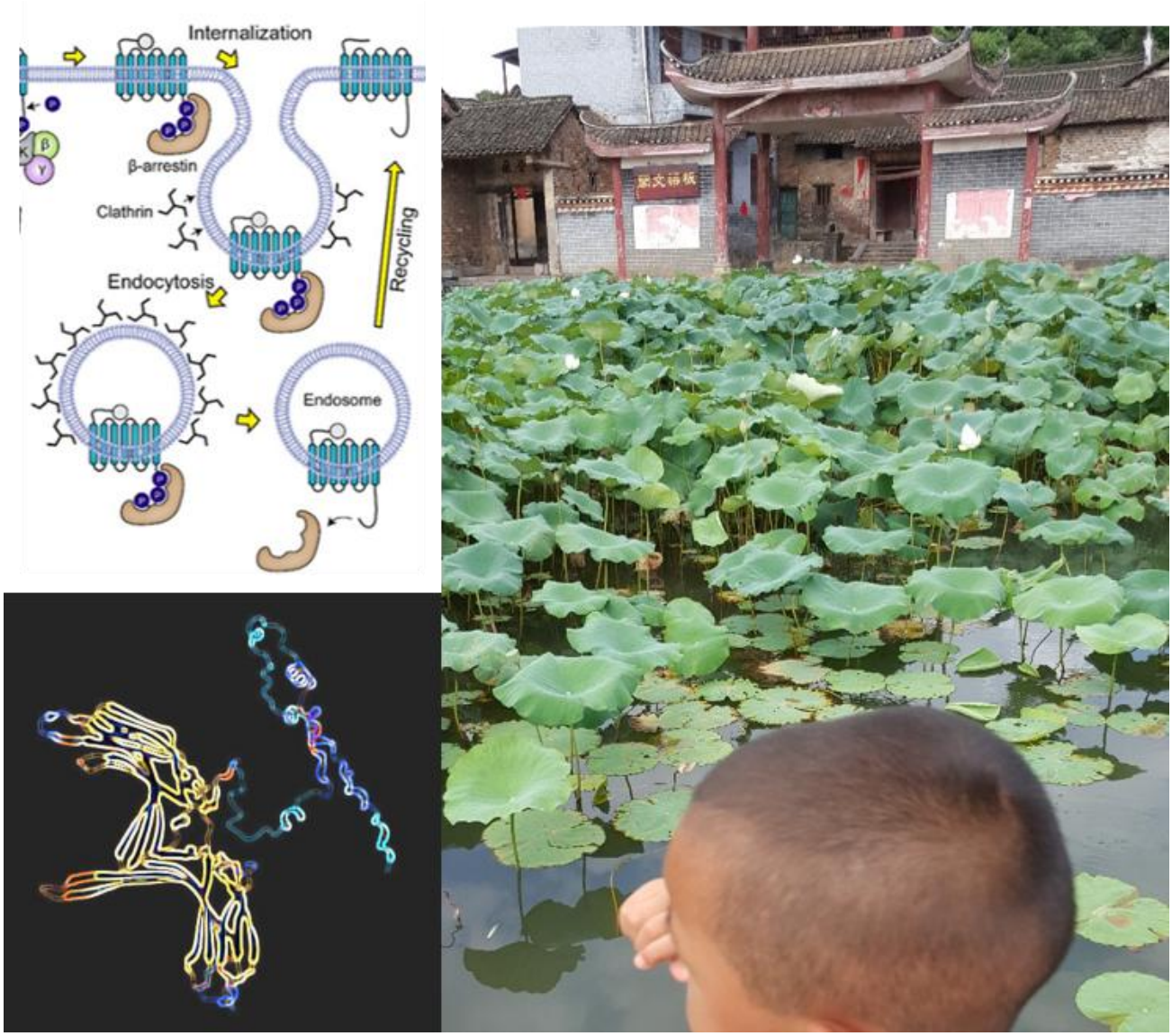


Figure 12. *Am I going to repaint the ancestral Hall?*
Some GPCRs are Recycled: Arrestin (Oakley et al 1999)

A photo collage of the arrestin mediated GPCR recycling, plus alphafold predicted arrestin structure (Provided through interPro, https://www.ebi.ac.uk/interpro/color inversed) and a photograph of the village Hall of the Hunan village.

(cartoon by Dr. Alvin Kwok)

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Arrestin is a GPCR-binding protein;

Many GPCRs are recycled through binding to arrestin, the function originally assigned.

Some GPCRs can function without G-proteins and works through binding with arrestin within the cell.

ArtingScience: *Further investigations suggested that arrestin is part of GPCR signaling pathways,*

Tuning system reactivity to signaling outcomes(He et al 2026).

Photography The Ancestral Hall with the village pond in front.

Am I going to repaint the ancestral Hall?

or am I let developments to take over?? A fishing pond for the visitors?

Continuing the series from the Hunan village.

Gain nor Rain

spade of gain
trot no far
got no not often
even no sure

a drop of rain

a spade of gain
not no special
got no not tomorrow
even no now
drop, drop of rain

spade of gain
not no yesterday
got so no pain
even no hysteria
drop, drop, drop of rain

spade of gain
not no remember
got so no thinking
even no again
rain drops on my hat

spade of grain
not so no again
got no again
even no again

pain thinking
not got a rai

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Figure 13. *Our Conceptual Sinuses I*
(Floatwood Craft ~35 x11 x12 cm)

(reference to Figure 3)

This is manifested in two woodblocks connected with a copper patina with two sides, a green and a metallic, balanced on whelk shell (signify wisdom in many cultures). There are multiple re- arrangements with th balancing positions and positioning of two blocks. The wood base has two nodes that are seconded as eyes. The sinus is commonly reagraded to posit between the nose and the cranium, which is the sphenoid Sinuses. The other 3 pairs include the maxillary (inside cheekbones), Ethmold (between eyes) and frontal (anove eyebrows)

These paranasal sinuses are a connected system of hollow, air-filled cavities located within your skull. While they are famous for causing pain when blocked, they perform several vital roles for your respiratory and structural health: air conditioning, mucus production, structural lightening, and voice resonance.

Retrospective is a unque human trait. I*n retrospection we build models on what happended, wishing to correct mistakes and to build of hard-learned experiences. Science and Arts are the two branches of human creativity-innovation, inception of which is not directly occuring with production but will dicttate fure productivity. They are the sinuses of human pespectives****,*** supporting, cleaning, cleansing, and listening.

Figure 14 ***Our Conceptual Sinuses II*** (Arting of Sciences is the description text for figures 13&14) PTO.

Photocollage of an image of Pacific oceanview from HKUST (night, next to the visitor lodege) with stair, a place where I used to do morning Tai Chi (the highly abbreviated form). The spider wiring morning dew was taken at the Pavillion with a view of the inland sea Port Sheltor.

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Conclusion



I enjoy both my science and my art, deliberating on how ScienceArt might allow these two sides of my preoccupation to reciprocate and deepen one another. The scientist in me continually seeks explanations, mechanisms, and deeper synthesis, while the artist in me resists jargon and asks instead for immediacy, imagination and feeling. In fact, my third side knows creativity-innovation is shared between arts and sciences, commonly in conceptual modeling of known pathways with the unknowns (cartoon of Fig.12), as artists models on life experiences.

Like an engaged GPCR, inclusive ScienceArts are undergoing conformational change, searching for a form through which different modes of perception can communicate. The photograph collage shows a pathway leading towards the unknown, illuminated by reflections from three drops of dew. To my scientific eye, they evoke the readiness of the heterotrimeric G protein, Gαβγ, poised to receive and amplify a signal initiated by receptor engagement. To my artistic eye, however, they need not represent molecules at all. They are simply light, water and direction: three points of illumination along an uncertain path. Science perpetually relies on breaking dogmas and rebuilding new ones. It is painful but joyful at the same time. Recalling the more-or-less sequential discoveries of carbohydrates, proteins, DNAs, RNAs, non-coding structural RNAs, micro RNAs……..with dogmas came and going, with new one being erected. ScienceArts facilitate thinking outside of the box (inspiration), often into the uncomfortable zone. “Spider wiring the three dews, superimposed with shadow from behind; it does not matter if I were not seen in the shadow. In the bottom photo, one side has weed while other side does not, which side is which is all in the mind. It is taking a view right in the middle that one can see either side. For scientists in the field, ArtingScience (more speculative modeling of science pathways that a paper may not allow) provides an opporttunity to stop-and-think. Many laboratories have retreats to make reviewing presentations and discuss the changing paradigms; this is in fact ArtingScience and where ScienceArts will help.

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From the Way come Truth and from Truth come One, from One come Two, and from Two come Three, that a multitude of things of which Ying (obscurity) *and Yang* (brightness) *intermingle to a well-balanced equilibrium*". (Chapter 42 of *Tao Te Ching* (道德經) by Laozi (老子) ~400-300 B.C).

The synthesis between arts and sciences provokes a transcendental feeling either my science-me or my art-me can inspire independently. My scientist side does not currently recognize ScienceArt as a scientific publication; my artist side may not recognise it yet as an artform. The fact that there are multiple aesthetic ways in superimposong presentations of metaphoric scienctific concepts, ScienceArts is in close allegience with arts (of a scientific topic with its jargon). It is the deeper understanding of interactive dynamics (for instance modeling on threshold, timer, additive, titration (etc) ways in the change of participating components) that we can contemplate the true temperments in molecular-biochemical cross-signaling pathways. Metaphors become neither proof nor decoration, but a way of thinking in our relentless seeking for the unknown. Putting the chinese character of a mouth (口) inside a gate(門) becomes questioning (問). The mouth looks empty, but emptyiness is always relative to fullfilment. Through our human capacity to model, imagine and express, the unknown becomes something we can approach through confinement-mixing of artistic and scientific conceptualization.

Acknowledgements.

All artworks remain the artist properties which including photograph uses for artisitic marketing. All artworks (including poems) are of my own except the cartoons from Dr. Alvin C.M. Kwok. I wish to thank Dr. Christophe Prehaud for helping with the French. This second Science=Art Recipricate was written more concise style with poetic connections between artworks when compared to '*Whirling in Waters'*, with ArtingScience section in some artworks https://www.openscience.fr/ScienceArt-Commune-1-Whirling-with-Waters.

This follwed many feedback and opinions from my science and artistic friends. I wish to thank the reviewer for his suggestions. ArtingScience should be done with scientists within each field, my attempts are aimed to provoke thoughts and to demonstrate its positionings.

As in the first chapter, ScienceArts Recipricate is not meant to be a review but as explained above as a point of artistic expression to draw attention to the field of interests. I change the series from Commune to Recipricate, aiming to illustrate the communications between arts and science will benefit both institutes of human creativity-innovations. Artists (including me sometimes) do not like his arts to be analysed but science cannot be accounted for without critical reviews. Research in my laboratory was supported by Research Grant Council of Hong Kong and from the State Key Laboratory of Molecular Neuroscience.

Figure 3 received third prize in 2023 Art Hong Kong exhibition (third artist) http://www.yshk-art.com/pithy-detail-2872.html

I added an art statement in my science website https://life-sci.hkust.edu.hk/team/tin-yum-wong/, including some of my recent artistic engagements. I started an Instagram account: intagram.com/joseph.wong.31945 with my artworks.

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