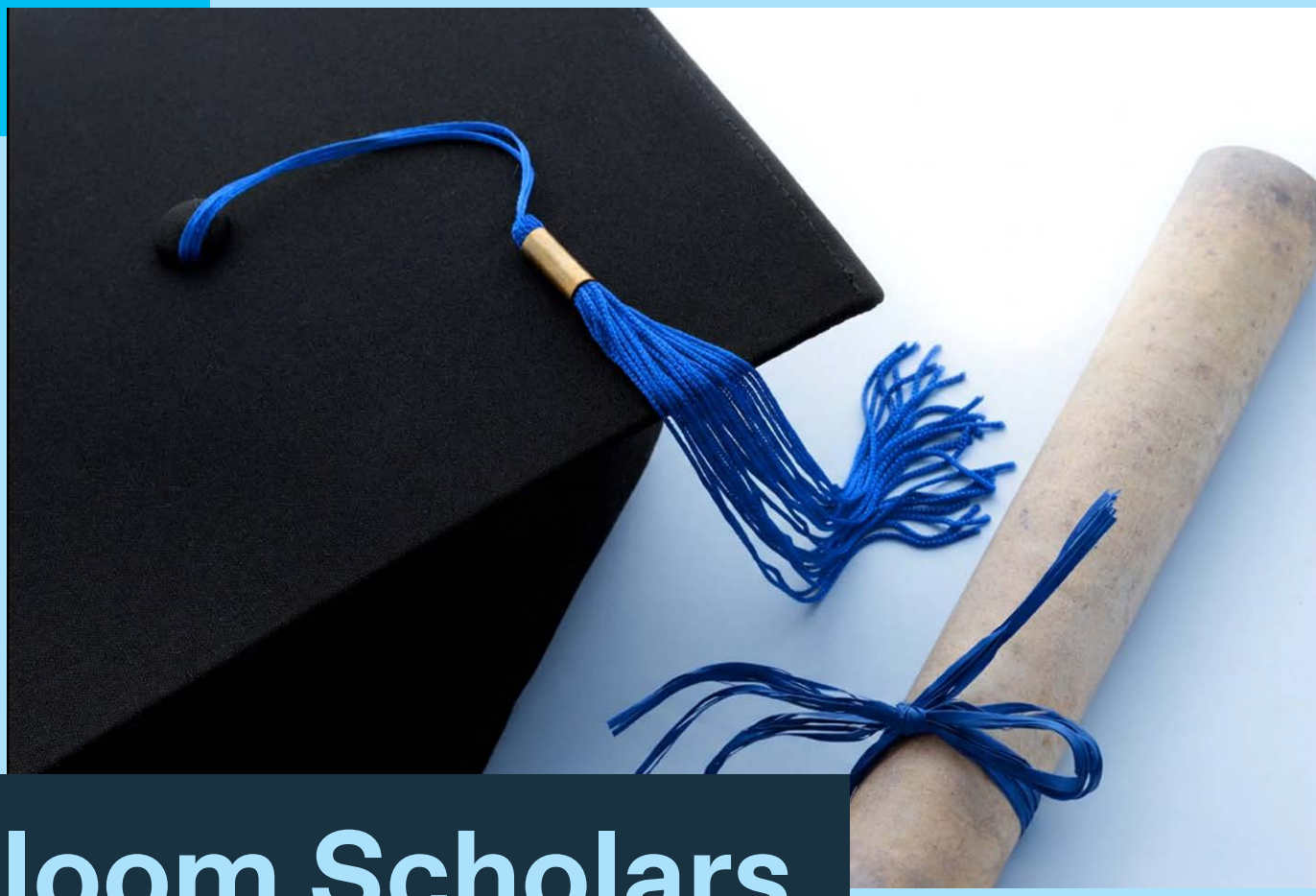
Graduate Studies Authority
Bloom Graduate School
UNIVERSITY OF HAIFA



Bloom Scholars 2027

Dear Research Students

The University of Haifa is committed to academic excellence, innovative and interdisciplinary research, and meaningful contributions to society. Rooted in a diverse and inclusive academic community, the University strives to advance knowledge and address pressing local and global challenges.

The Bloom School for Graduate Studies, established with the generous support of the Bloom family, plays a central role in advancing this vision by fostering outstanding doctoral and postdoctoral researchers, supporting scientific excellence, and promoting academic and professional development, international collaboration, and a vibrant research community.

We are proud to recognize this year's 16 recipients of the prestigious Bloom Fellowships - 12 doctoral students and four postdoctoral researchers - whose academic achievements, research potential, and dedication exemplify the values and aspirations of the University and the Bloom School.

This booklet introduces our fellowship recipients and highlights their research, reflecting the breadth, diversity, and excellence of the next generation of scholars at the University of Haifa.

We warmly congratulate all recipients and wish them continued success in their academic and research endeavors.

Greetings,



Prof. Gur Alroey
President



Prof. Mouna Maroun
Rector



Prof. Irit Akirav
Dean, Bloom School
for Graduate Studies



Dr. Noga Gratvol

Postdoctoral Student in the Department of Philosophy

Research Title: The Rationality of Attention

Supervisor: Prof. Arnon Keren

Short description of research:

My research is concerned with the role attention plays in our epistemic lives. We are generally presented with much more information than we can process. To reason with the information we have, and form beliefs on its basis, we need to prioritize—we need to attend to some pieces of information over others. In this way, what we attend to plays a decisive role in what we come to believe.

In many cases, attention is epistemically beneficial. Part of what makes birders experts in their field is the way they attend. However, attention can also go awry. We often criticize people for failing to notice something, or for overly focusing on the wrong thing. Consider Annie, who attends to her professional failures and ignores her successes, and therefore concludes that she is bad at her job. There's something amiss about Annie's situation, but is she being irrational? And if so, is she epistemically irrational or merely prudentially so? Is Annie justified in her belief that she is bad at her job?

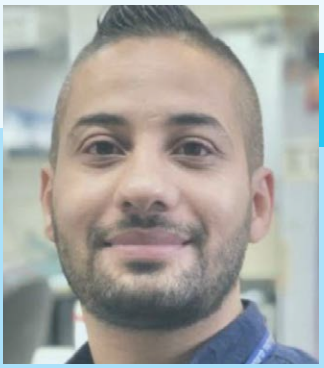
These are the kinds of questions I am interested in. I have argued that attention is rationally assessable, and that irrational attention can undermine the justification one has for subsequent beliefs. On my preferred theory, the attention is subject to inquiry-relative norms. In a slogan: how you should attend depends on what you want to know.

My plan for the near future is to explore the nature and rationality of disordered attention. I have argued that instances of attention are rationally assessable insofar as they are responsive to reasons, but what does this mean for individuals with attentional disorders such as ADHD, OCD, or extreme phobias? Is their attention responsive to reasons in the same way?

In addition, I intend to address perceptual attention in more detail, and particularly the phenomenon of inattentional blindness. We seem to be unaware of things that are right in front of our eyes, simply because we do not attend to them. Are we literally blind to unattended things, or are we just not able to report that we see them? Are we justified in believing unattended things are not present?



Credit: Dr. Noga Gratvol



Dr. Tala Salti

Postdoctoral Student in the Sagol Department of Neurobiology

Research Title: Programmable iPSC-Derived Exosomes for Precision Molecular Therapy of Dynein-Related Neurodevelopmental Disorders

Supervisor: Prof. Shani Stern

Short description of research:

Background and Significance - Rare neurodevelopmental disorders often lack effective treatments. Pathogenic variants in DYNC1H1, encoding cytoplasmic dynein 1 heavy chain, disrupt intracellular transport and neuronal function, leading predominantly to motor phenotypes. Therapeutic development is further challenged by the blood–brain barrier (BBB), which restricts delivery of therapeutic molecules to the CNS.

Innovation and Approach - We propose a programmable therapeutic platform based on exosomes derived from genetically engineered induced pluripotent stem cells (iPSCs). Patient-derived iPSCs carrying pathogenic DYNC1H1 variants will provide a human disease model and a platform for therapeutic development. Prime editing and site-specific recombination will be used to generate corrected isogenic lines and engineer iPSC "cell factories" producing exosomes enriched with defined therapeutic cargo. Exosomes are promising CNS delivery vehicles because of their ability to cross the BBB and transport functional proteins and nucleic acids.

Specific Aims - Aim 1: Establish and characterize patient-derived motor neurons, assessing axonal transport, mitochondrial trafficking, neuronal morphology, and electrophysiological function.

Aim 2: Correct pathogenic DYNC1H1 variants using prime editing and determine whether correction restores neuronal and intracellular transport functions.

Aim 3: Engineer programmable therapeutic exosomes carrying defined molecular cargo and evaluate their ability to rescue disease-associated cellular defects.

Expected Outcomes and Future Vision - This project will establish a validated human model of DYNC1H1 disease, a precise genome-editing strategy, and a scalable exosome-based CNS therapeutic platform.





Dr. Peter Kosenko

Postdoctoral Student in the Department of Mathematics

Research Title: Studying Random Walks on Groups Using Operator Algebras

Supervisor: Dr. Adam Dor-On

Short description of research:

A standard exercise in probability is to understand what happens if one flips a (potentially, unfair) coin repeatedly. In the same vein, one might consider a random walk on a square grid, and one might ask about the distribution of distance from the origin at a given time n > 0. We have standard methods to understand how many heads and tails we are expected to get after many throws, or the expected distance from the origin in the second problem: we have the laws of large numbers and the central limit theorem. My research is concerned with a powerful generalization of the above processes, where we study the asymptotic behaviour of random walks on infinite countable finitely generated groups. In other words, I study how a random walk on a Cayley graph of a finitely generated group behaves as the time goes to infinity. This behaviour heavily depends on what kind of group we choose and the step distribution that defines the random walk. There are many interesting open questions regarding these processes, and I intend to expand our knowledge about random walks in collaboration with my supervisor, Dr. Adam Dor-On.

To make progress in some of the related questions, I am using tools from probability theory and other mathematical fields, such as geometric group theory and harmonic analysis.

As a part of my research proposal, I am going to work on several topics related to random walks on relatively hyperbolic groups and C*-algebras related to them with Dr. Dor-On and his collaborators. The key feature of this setting is negative curvature that one can observe visually in the geometry involved. The goal is to better understand certain bordifications (“boundaries”) that we can correspond to a random walk on a relatively hyperbolic group. To this end, we are going to focus our attention on Martin and Busemann boundaries. In simple terms, we aim to study the way random walks on groups converge to a geometric boundary using tools from harmonic analysis and operator algebras.

Moreover, I am also interested in studying random walks on the following non-strictly hyperbolic but hyperbolic-like groups: acylindrically hyperbolic groups, groups of intermediate growth (in particular, self-similar groups), lamplighter groups, and Baumslag-Solitar groups $BS(m, n)$.

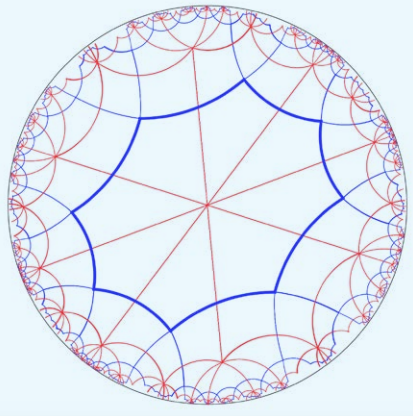


Figure 1: Example of a group acting on a hyperbolic plane via isometries. Generated by Petr Kosenko, Giulio Tiozzo in Wolfram Mathematica.

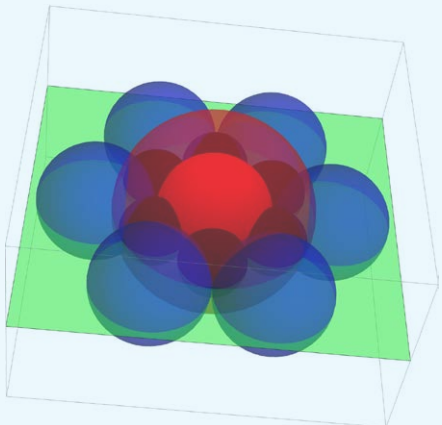


Figure 2: A hyperbolic polyhedron. Generated by Nikolay Bogachev in Wolfram Mathematica.



Dr. Muna Abd El-Raziq

Postdoctoral Student in the Department of Communication Sciences and Disorders

Research Title: Real-Time Spoken-Word Recognition in Quiet and Noise: Exploring Links with Neural Speech Encoding

Supervisor: Prof. Hanin Karawani-Khoury

Short description of research:

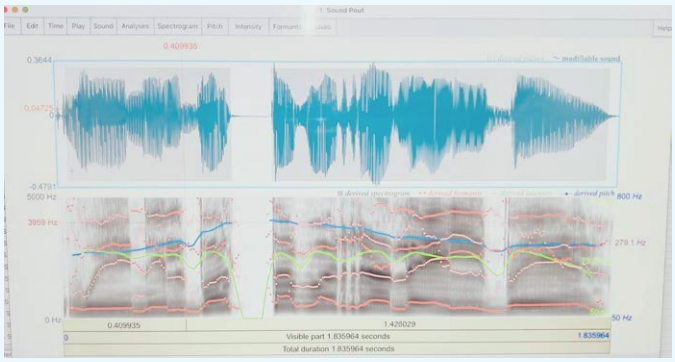
Building on my research on language in autism and my Fulbright postdoctoral training at New York University, where I developed eye-tracking paradigms to investigate real-time spoken-language comprehension, my postdoctoral research will examine how children recognize spoken words under challenging listening conditions. In collaboration with Prof. Hanin Karawani-Khoury, whose research focuses on auditory processing and speech perception in noise, I will use eye-tracking to examine spoken-word recognition in quiet and noisy backgrounds.

The Looking-While-Listening paradigm provides an objective measure of moment-by-moment spoken-word recognition (Fernald et al., 2008), allowing examination of how background noise affects language processing as it unfolds. The study will investigate whether language ability, phonological working memory, and nonverbal reasoning contribute to individual differences in spoken-word recognition and whether their contributions become particularly important under adverse listening conditions.

A complementary component will explore the relationship between eye-tracking measures and the Frequency-Following Response (FFR), an objective neural measure of speech encoding (Galbraith et al., 2004; Chandrasekaran & Kraus, 2010). Khalaila-Zbidat and Karawani-Khoury (2025) demonstrated that the contribution of working memory to speech-in-noise perception is moderated by the fidelity of neural speech encoding. Integrating these approaches will allow us to explore whether individual differences in neural speech encoding relate to real-time spoken-language processing.

This question is particularly relevant in autism, where language and cognitive profiles are heterogeneous (Abd El-Raziq et al., 2025; Schaeffer et al., 2023), and spoken-language comprehension can be difficult to assess behaviorally because of communication differences (Boucher, 2012). Moreover, everyday spoken-language comprehension rarely occurs in silence, as children often process speech in background noise. Examining comprehension in both quiet and noise may therefore better capture spoken-language processing in autistic and typically developing children under everyday listening conditions.

By combining my expertise in eye-tracking, language, and autism with Prof. Karawani-Khoury's expertise in auditory neuroscience and speech perception in noise, this project will establish an interdisciplinary framework for investigating how cognitive and neural factors shape real-time spoken-word recognition in autistic and typically developing children.



An Example of an audio recording



Dafna Eliyahou

Ph.D. Student in the Department of Marine Geosciences

Research Title: Field Observations of Munition Mobility and Burial Dynamics Across an Inner-Shelf Depth Transect

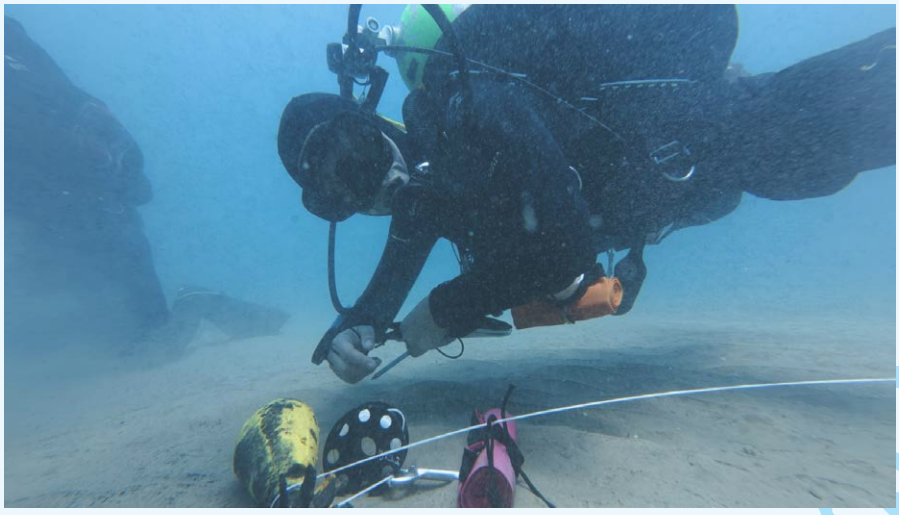
Supervisors: Prof. Beverly Goodman-Tchernov and Dr. Roy Jaijel

Short description of research:

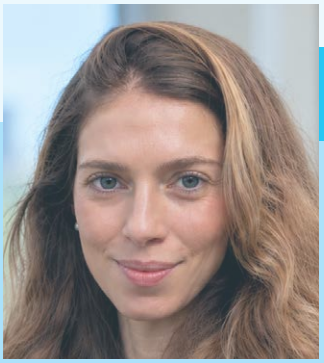
Coastal environments worldwide contain large quantities of unexploded ordnance and discarded munitions, the legacy of wars, naval operations, military training and historical disposal at sea. Along the Israeli coast, munitions from a century of military activity are still found exposed in shallow water or washed ashore. As coastal military areas are considered for public use, predicting the position and burial state of these objects has become an urgent scientific and practical need. Existing approaches, however, rely largely on laboratory experiments and simplified models, and have rarely been tested against direct field observations of munition motion.

My doctoral research quantifies the response of submerged munitions to hydrodynamic forcing on energetic, wave-dominated microtidal coasts, and identifies the processes and thresholds that govern the transitions between exposure, transport and burial. Conducted under the supervision of Prof. Beverly Goodman-Tchernov of the University of Haifa and Dr. Roy Jaijel of Israel Oceanographic and Limnological Research, the study draws on controlled field deployments of inert munitions that vary in size, mass and specific gravity, placed on the inner continental shelf off Rishon LeZion at depths of 5, 10 and 15 metres. Embedded accelerometers and repeated diver surveys tracked the objects year-round, through calm periods and storms, alongside measurements of seabed elevation change and near-bed hydrodynamics.

Analysis of the accelerometer and hydrodynamic records will define thresholds for the onset and cessation of motion and the kinematics of transport during individual storms. By linking object motion to measured waves, currents and seabed change, this project turns a largely model-based question into one that can be tested in the field. Its scientific contribution is to clarify how the physical properties of munitions shape their response to hydrodynamic and sedimentary processes, providing the basis for more reliable predictions of transport and burial across a range of environmental conditions. Practically, close collaboration with the Mine Clearance Authority of the Israeli Ministry of Defense provides a direct pathway from the research to clearance planning and coastal management in Israel.



Credit: Prof. Beverly Goodman-Tchernov



Hadas Cohen (Kuzmenko)

Ph.D. Student in the Hatter Department of Marine Technologies

Research Title: Continuous-Time Neural Architectures for Distributed Neuroinflammation Inference and Control

Supervisor: Dr. Oren Gal

Short description of research:

Multiple sclerosis (MS) is a disease in which the immune system attacks the brain and spinal cord. This causes inflammation that appears, spreads and fades over hours to days. Today, doctors see this inflammation mainly through periodic MRI scans, which capture only snapshots of a process that is constantly changing. My research asks a forward-looking question: what if a swarm of tiny sensing agents moving through brain tissue could track the inflammation continuously, and eventually respond to it locally?

This idea raises a fundamental challenge. Each agent sees only its immediate surroundings, and communication between agents inside the body would be very limited: short, infrequent messages rather than a constant stream. The swarm must therefore build a shared picture of the whole inflammation "map" from scattered, delayed pieces of information, without any central controller.

To address this, I develop artificial intelligence based on continuous-time neural networks, especially Liquid Time-Constant (LTC) networks. Standard neural networks process information in fixed time steps. LTC networks are inspired by biological neurons and naturally handle data that arrives at irregular times. My central hypothesis is that this makes them especially well suited to agents that must keep reasoning in the long gaps between communication events.

The research has three stages, all carried out in computer simulations of MS brain tissue built on established mathematical models of inflammation. First, I will test how accurately a swarm can reconstruct the inflammation map as communication becomes sparser. I will compare my approach to leading alternatives such as Transformer-based models. Second, I will teach the agents to decide together where to move to gather the most useful information. Third, I will explore closed-loop treatment, where agents release medication precisely where and when it is needed, and study how the approach scales to larger swarms.

This work builds directly on my M.Sc. research, published in Applied Ocean Research, where I used the same type of networks to model trajectories for autonomous oil spill response at sea. In both cases, the core problem is the same: a team of autonomous agents tracking a spreading phenomenon under uncertainty. Beyond MS, these methods could benefit any setting where decentralized robots must monitor and act on a changing environment, from targeted medicine to marine robotics.



AI-generated image: working on multi-agent inference of MS neuroinflammation dynamics



Rohit Kumar Singh

Ph.D. Student in the Sagol Department of Neurobiology

Research Title: Encoding of Arousal-Associated Olfactory Stimuli by Piezo2-Expressing Mitral Cells and Their Role in Sexual and Predator-Avoidance Behaviours

Supervisor: Dr. Luna Jammal Salameh

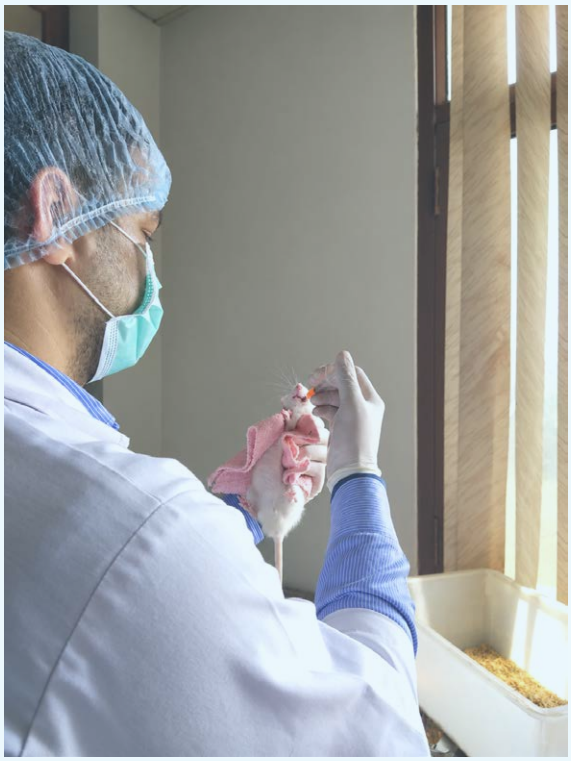
Short description of research:

Understanding how the brain integrates internal physiological signals with external sensory information is fundamental to explaining adaptive behaviour. Physiological arousal characterised by changes in heart rate and blood pressure generates interoceptive signals that influence emotional and behavioural responses. Although disturbances in interoception have been linked to anxiety and fear-related disorders, the neural mechanisms through which cardiovascular signals shape behaviour remain poorly understood. This research aims to investigate how mechanosensory signalling within the olfactory bulb contributes to arousal-dependent social and defensive behaviours.

Recent findings have identified a subset of mitral cells in the olfactory bulb that express the mechanosensitive ion channel Piezo2. These neurons respond to heartbeat-driven vascular pulsations and appear to integrate cardiovascular information with olfactory processing. Preliminary studies demonstrated that selective knockdown of Piezo2 reduces heartbeat-related neuronal oscillations and impairs sexually motivated behaviours without affecting general olfactory function, suggesting a specialised role in behavioural modulation.

The central hypothesis of this project is that Piezo2-expressing mitral cells integrate cardiovascular interoceptive signals with olfactory cues to regulate behaviours associated with heightened arousal. Specifically, activation of these neurons is expected to enhance whereas inhibition is expected to impair social and defensive responses. To test this hypothesis experiments will be conducted using Piezo2-Cre transgenic mice. In vivo calcium imaging will be employed to monitor neuronal activity while bidirectional optogenetics will enable selective activation or inhibition of Piezo2-positive mitral cells. Neuronal responses will be examined during exposure to biologically relevant odours including receptive female bedding and predator odours such as fox urine. Simultaneous imaging and behavioural analysis will determine how modulation of Piezo2-expressing neurons influences attraction, avoidance, investigation and freezing behaviours.

This research is expected to establish a causal relationship between cardiovascular interoceptive signalling and olfactory-guided behaviour. By elucidating the neural circuits that integrate internal physiological states with sensory processing the study will advance our understanding of brain-body communication. The findings may also provide novel insights into the pathophysiology of neuropsychiatric disorders characterised by disrupted interoception including anxiety and fear-related conditions and may identify potential targets for future therapeutic interventions.





Chen Sharon Yagol

Ph.D. Student in the Department of Information Systems

Research Title: A Computational Framework for Detecting Changes in Inter-Tissue Coordination and Directional Immune Leakage During Aging and Alzheimer's Disease Development

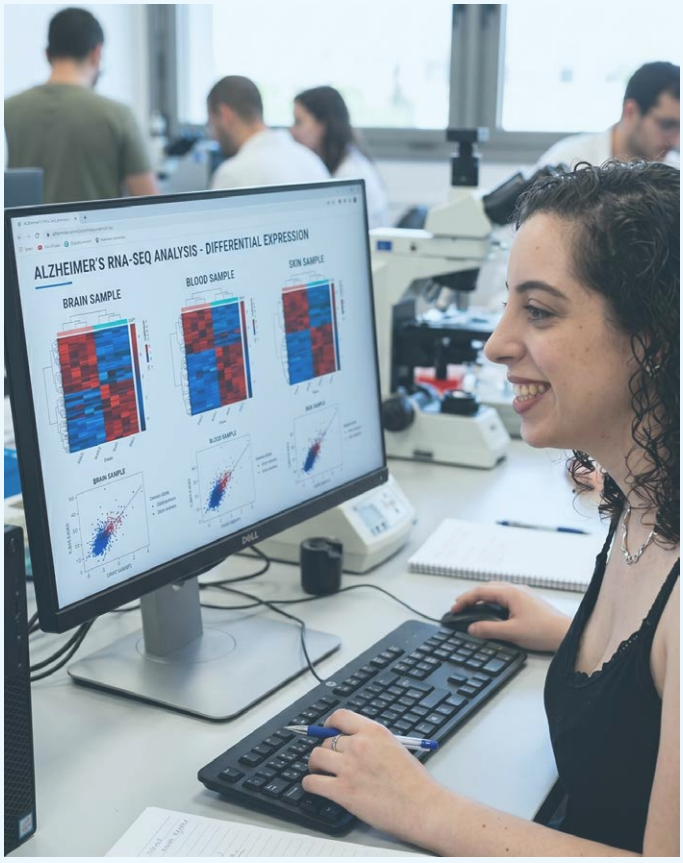
Supervisor: Dr. Judith Somekh

Short description of research:

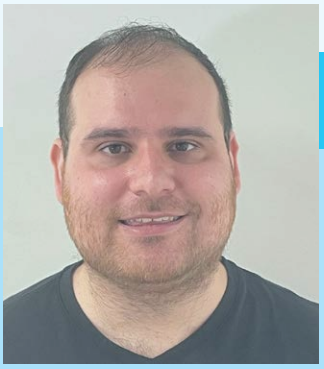
Although the study of systemic involvement in Alzheimer's disease is an emerging frontier, the majority of current research remains primarily focused on localized brain pathology and the clearance of aggregating proteins. Recognizing the growing importance of inter-tissue communication, there is a crucial need to expand the scope of AD research toward a multi-systemic approach. The goals of this study are to find, through bioinformatic means, the impact of resilience to motor or cognitive problems on the synchronization between the brain and the peripheral nervous system, focusing on changes in the leakage of immune system cells in aging and Alzheimer's patients.

The approach proposed here is groundbreaking in that it develops dedicated dissection tools, inter-tissue comparison methods, and new computational models for analyzing the immune system and synchronizing diverse tissues using ante-mortem data. This allows for a holistic view of the body as an interconnected whole rather than as isolated components, evaluating interconnected systemic biological networks, specifically the brain, blood, and the peripheral nervous system. This approach will enable a comprehensive understanding of how the immune system serves as the primary biological bridge connecting these diverse networks, actively modulating central AD pathology.

Furthermore, the combination of advanced computational analysis and laboratory validation allows not only to identify new molecular markers, but also to translate them into simple and non-invasive diagnostic tools. Projecting these findings onto peripheral tissues such as the skin will enable the discovery of unique biomarkers, through which non-invasive tests can be developed. Ultimately, these methodological developments will drive new discoveries in the field of neurodegeneration and resilience, making it possible to bridge the gap between central mechanisms in the brain and accessible peripheral expressions.



AI-generated illustration of the planned research



Matan Aharon Mayerowicz

Ph.D. Student in the Department of Information Systems

Research Title: Cognitive Support for Analyzing Human–LLM Interaction in Conceptual Modeling

Supervisor: Prof. Iris Reinhartz-Berger

Short description of research:

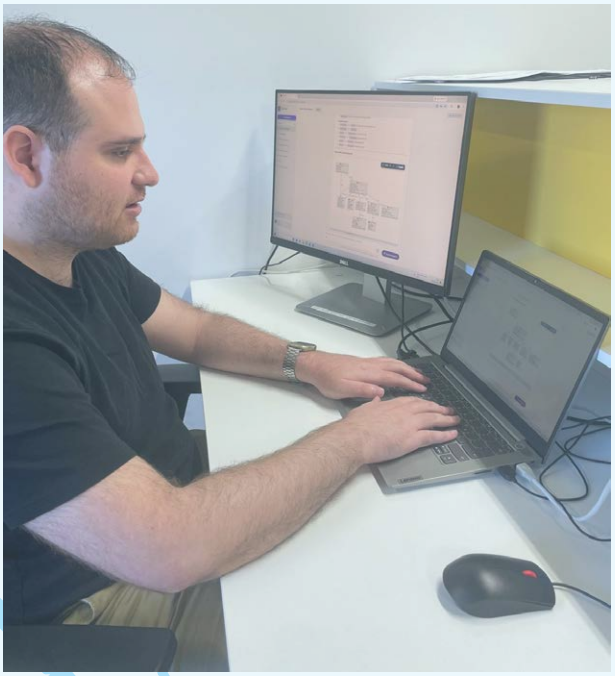
Conceptual modeling is the process of constructing abstract representations of a domain or information system based on requirements and domain knowledge. These representations, often expressed through diagrams, capture important aspects of a system, such as its entities, relationships, interactions, and behavior, and provide a foundation for the design and development of information systems. Conceptual modeling is therefore both a technical and cognitive activity, requiring interpretation, reasoning, and design decisions about how a system should be represented.

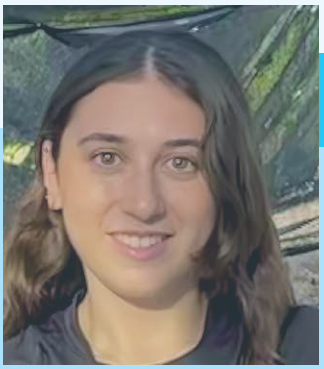
Large Language Models (LLMs), such as ChatGPT, help users generate and refine conceptual modeling artifacts such as UML class diagrams, use case diagrams, and state diagrams from natural-language descriptions. Although LLMs can produce plausible and structurally valid models, research has shown that their outputs may contain semantic inaccuracies and inconsistencies. As a result, effective AI-assisted modeling requires humans to evaluate, question, correct, and integrate AI-generated suggestions. Conceptual modeling is consequently becoming an interactive process in which humans and AI jointly construct modeling solutions.

My research investigates this human–LLM collaboration from a cognitive perspective. Rather than focusing only on the quality or correctness of the final model, I examine how people interact with LLMs while developing and refining conceptual models. The research uses the exploration–exploitation framework as a theoretical lens for understanding these interactions. Exploitation refers to continuing with a currently preferred approach based on existing knowledge, whereas exploration involves seeking new information, alternatives, or possibilities that may lead to better solutions.

The research examines how modelers alternate between exploration and exploitation during modeling sessions, how these behaviors develop over time, and how they relate to users' intentions and modeling outcomes. The research addresses these questions through three complementary studies, combining a behavioral taxonomy of user interactions, an analysis of how these behaviors unfold over the course of a session, and an examination of their relationship to user satisfaction and modeling outcomes.

The expected contribution is a cognitive framework for understanding human–LLM collaboration in conceptual modeling. By shifting attention from AI-generated outputs to the interaction process itself, this research aims to provide new insight into how people work with generative AI and inform the design of AI-assisted tools that better support human reasoning, judgment, and decision-making.





Hannah Farrell

Ph.D. Student in the Department of Maritime Civilizations

Research Title: The Changing Sea: A Bioarchaeological Approach to the Collapse of Marine Ecosystems in the Eastern Mediterranean Sea

Supervisors: Prof. Guy Bar-Oz and Prof. Nimrod Marom

Short description of research:

The Mediterranean Sea is a unique, semi-enclosed marine basin characterized by high levels of endemism and complex oceanographic gradients, making it one of the world's most critical marine biodiversity hotspots (Wood, 2024). Its easternmost basin, the Eastern Mediterranean, has served as a vital focal point for human civilization, sustaining coastal communities through diverse fisheries and maritime trade (Holden and Purcell, 2000). However, this long history of intense interaction means the Mediterranean has also become one of the most heavily impacted marine ecosystems globally, suffering from centuries of overexploitation, localized habitat degradation, and, more recently, severe species invasion and industrial pollution (Coll et al., 2010; Ramírez et al., 2018; Fanelli et al., 2021; EMME-CCI, 2025). My research examines the long-term restructuring and collapse of marine ecosystems in the Eastern Mediterranean, focusing on marine trophic complexity and ecology from the archaeological record to historical period. Because systematic scientific monitoring only began after significant industrialization and environmental modification (ca. early 1950s) were already underway, modern conservation efforts are severely hindered by "shifting baseline syndrome" (Izzo et al., 2016; Lilkendey et al., 2025). This refers to the acceptance of the current, already degraded sea as the standard by each generation, forgetting how diverse the ecosystem used to be (Pauly, 1995; Leitao et al., 2020).

Understanding the sustainably-used, pre-industrial Mediterranean ecosystem, is essential for accurately defining modern biodiversity loss and setting realistic restoration targets. The foundation of this project relies on two unprecedented regional resources. The first resource is the archival collection of the zooarchaeologist Dr. Omri Lernau, who has generously allowed full access to his life's work as a fish specialist upon his recent retirement. The second key resource is a historical fish bone assemblage from Miqveh Israel, the official city dump of Tel Aviv in the 1930's. Bringing together these two resources offers a rare opportunity to investigate and connect bioarchaeological data to establish a "before picture" and begin to resolve the generational loss of the true biodiversity of the Mediterranean Sea. This bridges bioarchaeological data with the current state of the art concepts and analyses in the field and provides an important framework for understanding the shifting baseline syndrome and its causes, consequences, and implications for future/current environmental research. Defining what an eastern Mediterranean fishery looked like in terms of species abundance, fish size, and environmental setting before 20th-century industrialization will provide actionable baseline targets for modern marine conservation, ecosystem restoration, and sustainable fisheries management.

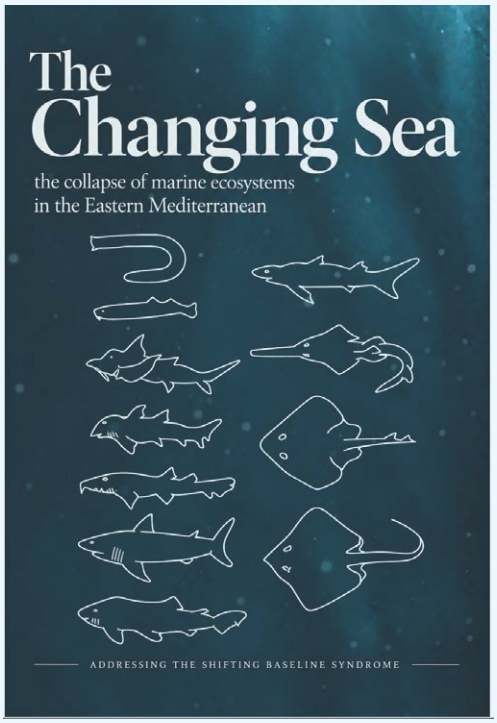


*Illustration drawn by H. Farrell in Adobe Illustrator, text edited onto background and scaled in Microsoft pptx.



Tamar Bernstein

Ph.D. Student in the Interdisciplinary Program in Child Development

Research Title: The Effects of Exposure to War on Early Childhood Development: The Mediating Role of Parental Representations Among Mothers and Fathers

Supervisor: Prof. Efrat Sher-Censor

Short description of research:

This proposed doctoral research investigates the effects of prolonged exposure to war on early childhood development, specifically focusing on the mediating role of parental representations. Following the unprecedented and prolonged conflict that began in Israel in October 2023, there is a critical need to understand how collective trauma impacts infants and toddlers.

While existing literature extensively covers the effects of war on older children, the impact on infancy and toddlerhood remains under-researched. During early childhood, parental distress and disruptions to the caregiving environment often predict developmental outcomes more strongly than direct exposure to trauma. Therefore, this study aims to examine how continuous security threats—particularly family displacement and prolonged parental absence due to military reserve duty—affect the psychological well-being of parents and their capacity to maintain positive and coherent mental representations of their children. Furthermore, this study addresses the significant underrepresentation of fathers in developmental and trauma research by including both maternal and paternal perspectives.

The research proposes three main hypotheses. First, direct and indirect exposure to war-related events will correlate with a deterioration in parents' mental health and reduce the positivity and coherence of their parental representations. Second, higher levels of parental war exposure will predict socio-emotional and developmental difficulties in their children. Third, parental mental health and the quality of their representations will mediate the relationship between war exposure and child developmental outcomes. An exploratory analysis will also examine the differences and similarities between mothers and fathers in these domains.

Employing a prospective longitudinal design in collaboration with the "Goshen Center," the study will follow 415 families with infants born during the first year of the war, half of whom were displaced. Building on initial maternal data, this research adds two annual follow-up points and integrates fathers into the cohort. Data collection utilizes validated questionnaires to assess war exposure, parental distress, and child development. Crucially, parental representations will be evaluated using the Five-Minute Speech Sample (FMSS), an observational tool that captures underlying emotional organization and coherence beyond standard self-reports.

Ultimately, this longitudinal research will map the mechanisms of risk and resilience in families enduring prolonged conflict. By illuminating how collective trauma permeates the parent-child relationship, the findings will provide a vital empirical foundation for developing targeted, early interventions to support vulnerable families.



AI-generated illustration of the planned research



Dana Zoabi

Ph.D. Student in the Department of Psychology

Research Title: Hormonal Modulation of Social Touch and Interpersonal Neural Synchrony

Supervisor: Prof. Simone Shamay-Tsoory

Short description of research:

My research focuses on social touch and how naturally occurring hormonal fluctuations may shape the way women perceive and experience touch, as well as how these processes relate to interpersonal connection. Touch is a fundamental form of human social communication, conveying affection, comfort, trust, and connection. Despite its importance for social functioning and well-being, relatively little is known about how hormonal states influence the subjective experience and neural processing of social touch, or how these processes extend to real-world interpersonal relationships.

My doctoral research will address these questions through three complementary studies examining behavioral responses, neural mechanisms, and interpersonal dynamics. First, I will investigate whether women's perception of social touch varies across the menstrual cycle. Using an online behavioral paradigm, participants will evaluate images depicting social touch, non-social touch, and non-touch interactions. These responses will be examined in relation to self-reported menstrual cycle phase and individual differences in touch avoidance and relevant psychological traits. This study will provide an initial assessment of how menstrual cycle-related variation relates to social-touch perception.

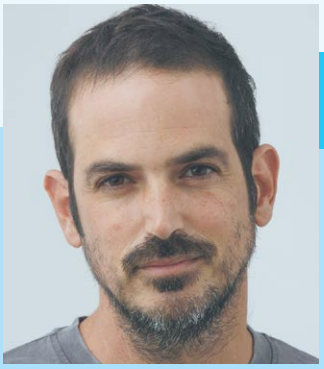
Second, I will examine the neural mechanisms underlying social-touch perception using electroencephalography (EEG). Women will be assessed at two menstrual cycle phases: the early follicular phase and the mid-luteal phase. Saliva samples will be analyzed to quantify estradiol, progesterone, and testosterone concentrations using liquid chromatography–tandem mass spectrometry (LC-MS/MS). By integrating behavioral, electrophysiological, and biochemical measures, this study will examine whether menstrual cycle phase and individual hormonal concentrations are associated with differences in subjective social-touch perception and its neural processing.

Third, I will extend this investigation to romantic relationships by examining how hormonal variation relates to interpersonal experiences and neural synchrony between partners. Approximately 100 romantic couples will participate in social interactions involving touch, affiliative conversation, and conflict-related discussion. Functional near-infrared spectroscopy (fNIRS) hyperscanning will be used to measure inter-brain synchrony during these interactions. Hormonal assessments before and after the tasks, alongside daily reports collected over three weeks, will help characterize associations between hormonal states, everyday social experiences, and interpersonal dynamics.

By integrating social neuroscience, endocrinology, and interpersonal neuroscience, this research aims to advance our understanding of how naturally occurring biological variation relates to social perception, neural processing, and interpersonal connection. Ultimately, it seeks to establish a multilevel framework for investigating the interplay between hormonal states and the social processes that contribute to human relationships.



AI-generated illustration of the planned research



Alon Levy

Ph.D. Student in the Department of Geography and Environmental Studies

Research Title: Developing and Assessing a Vis-NIR Spectroscopic Model for Decoding Microalgal Photophysical and Stress Dynamics

Supervisors: Prof. Anna Brook and Prof. Dan Tchernov

Short description of research:

Microalgae represent high-value raw materials fueling the biotechnology, pharmaceutical, green energy, and aquaculture sectors, while also serving as vital nature-based solutions for broader global challenges—driving innovations in wastewater treatment, atmospheric carbon capture, and deep-space life support systems. In this critical industry, rapid and accurate decision-making bridges the gap between high profitability, operational efficiency, and sustainable growth.

In the age of AI, processing massive datasets has become more accessible and affordable, enabling systems to make highly reliable, data-driven decisions. However, generating the high-quality training data required to power these models remains the true challenge. Currently, commercial cultivation frequently suffers from sudden, catastrophic culture die-offs. Visual indicators of physiological stress appear too late for intervention, and standard wet-chemistry analyses require 24 to 48 hours to yield actionable data. This critical diagnostic lag in detecting early biochemical shifts prevents timely metabolic optimization, resulting in a devastating 20–25% annual crop loss.

To address this fundamental industrial bottleneck of absent real-time diagnostic methodologies, this research proposes a continuous, non-invasive in-situ monitoring framework utilizing Visible-Near-Infrared (Vis-NIR) spectroscopy (350–1000 nm), focusing on the following key objectives:

Correlate Biochemical Profiles: Align high-resolution analytical chemistry data with Vis-NIR spectra to pinpoint specific molecular absorption features.

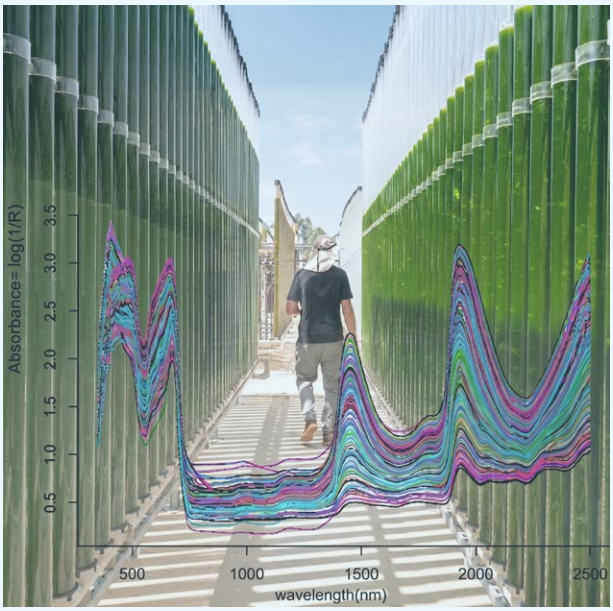
Map Stress Signatures: Track dynamic spectral changes by subjecting cultures to controlled stress regimes, such as nitrogen starvation and irradiance shocks.

Isolate Physiological Signals: Develop robust preprocessing pipelines to filter out physical artifacts like biofouling, particulate matter, and air bubbles.

Optimize AI Architectures: Refine deep learning models (specifically 1D-CNN and DenseNet) for efficient feature extraction and precise spectral decoding.

Deploy and Validate: In collaboration with BARALGAE, this research will integrate the optimized algorithms into an in-situ sensor on an outdoor bioreactor to test real-time predictive accuracy under commercial conditions.

By combining computational analysis and spectral data from commercial bioreactors, this research delivers critical theoretical and practical breakthroughs. It enables early stress detection and dynamic biochemical profiling, advancing our understanding of microalgal photophysics while boosting cultivation efficiency. Ultimately, this framework lays the groundwork for fully autonomous, data-driven production models.





Lior Shvarts

Ph.D. Student in the School of Political Sciences

Research Title: The Friends-and-Neighbors Effect in a Nationwide Electoral System: Voter-Politician Dynamics in Voting Patterns and Parliamentary Behavior

Supervisor: Dr. Liran Harsgor

Short description of research:

My research examines the central role of the geographical component within a nationwide electoral system, where the entire country constitutes a single voting district. In majoritarian or district-based systems, where a nation is divided into structured constituencies, geography plays a pivotal and highly visible role. This manifests either through structural incentives for parliamentary candidates to cultivate deep local ties, or through constitutional mandates requiring regional representation. However, within a nationwide proportional system, the significance of the geographical factor remains understudied and insufficiently clear. On one hand, voters cast ballots for political parties, and the residential distribution of candidates does not necessarily reflect an even geographic spread across all regions. On the other hand, voters may still perceive candidates and members of parliament residing in their immediate vicinity as local representatives who will champion regional interests. From another perspective, members of parliament themselves may independently engage in parliamentary behaviors that are actively shaped by such geographic considerations.

Consequently, this research addresses the placement of geography within nationwide electoral systems. This question aligns with prominent debates in political science literature concerning political representation, electoral system design, and voter behavior. Specifically, it builds upon the well-established "Friends-and-Neighbors Effect", which posits that voters provide elevated electoral support to candidates who live in their own localities. This behavioral effect is sustained by a sense of shared identity toward politicians from similar backgrounds, as well as by local social networks that are particularly vibrant in smaller localities. Utilizing the Israeli political system – a typical example of a strict nationwide electoral framework – as its primary case study, alongside comparative analyses of countries with contrasting electoral designs, this study employs statistical analyses based on official administrative datasets and comprehensive election surveys.

The potential contribution of this research lies in identifying local affinity as a crucial voting consideration that emerges organically from community needs and desires for regional representation, rather than as a byproduct of formal institutional rules. In this manner, geographic proximity can be understood as an "organic" driver of political behavior, functioning even in the complete absence of a constitutional mechanism that mandates it. Furthermore, the study expands the existing literature by applying the friends-and-neighbors framework to nationwide systems. Finally, the research offers practical implications: demonstrating that candidates consistently secure heightened support within their home municipalities could incentivize political parties to actively promote and maintain balanced geographic diversity across their electoral candidate lists.



AI-generated illustration of the planned research



Elitzur Bar Yehuda

Ph.D. Student in the Department of Philosophy

Research Title: Speaking Without Experience

Supervisor: Prof. Meir Hemmo

Short description of research:

As humanity appears to be on the brink of creating truly artificial intelligence, it has never been more important to understand what gives rise to consciousness. Among other reasons, whether AIs are conscious will determine how we ought to treat them. Yet we still lack an adequate theory of mind that solves this puzzle with a reassuring degree of certainty.

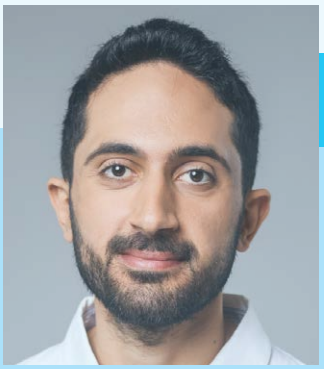
One alternative approach, even in the absence of knowledge about the source of consciousness, is to detect consciousness using a Turing-style test. Such an approach assumes that linguistic competence concerning consciousness provides evidence for consciousness itself. This view faces a natural objection: if a silicon brain functions like a biological brain and does everything a biological brain does, what difference would consciousness make to its linguistic behavior? There seems to be no principled reason why a machine that functions like a brain could not talk about conscious experiences even if it lacks them. Presumably, it could even describe how it is planning to write a PhD about the importance of determining whether certain systems are conscious.

In my PhD research, I aim to explore this objection. In particular, I will examine a possibility that has received very little attention: there is reason to doubt that a non-conscious creature that learns language in roughly the same way we do, by developmental immersion and social feedback (unlike current LLMs), can possess the same linguistic repertoire as a human, including, for instance, accepting the widely held view that there is a distinctive mind–body problem. How could a non-conscious creature understand consciousness well enough to appreciate the difficulty of situating it within the physical realm?

My research will explore whether mastery of concepts such as consciousness itself presupposes conscious experience. I will draw on tools from the philosophy of mind and language to assess these questions. The conclusions may have serious implications to the philosophy of language and the philosophy of artificial intelligence, which I also intend to explore.



AI-generated illustration of the planned research



Roy Netzer

Ph.D. Student in the Department of Physical Therapy

Research Title: Predicting Sarcopenia Risk During Incretin-Based Weight Management: Developing and Validating a Clinical Prediction Model

Supervisor: Dr. Michal Elboim-Gabyzon

Short description of research:

Incretin-based therapies have transformed the treatment of obesity and type 2 diabetes. These include glucagon-like peptide-1 (GLP-1) receptor agonists and dual glucose-dependent insulinotropic polypeptide (GIP)/GLP-1 receptor agonists. Alongside substantial weight loss, reductions in lean body mass raise questions about muscle health and physical function. Lean mass loss alone does not establish sarcopenia, a muscle disease defined by low muscle strength and low muscle mass. Sarcopenia is associated with impaired mobility, loss of independence, and increased risks of falls and hospitalization. Current evidence does not establish that incretin-based treatment necessarily causes sarcopenia. Outcomes vary between patients, highlighting the need to consider both their initial condition and their response to treatment.

Despite this variability, a validated model for predicting individual sarcopenia risk in adults starting these incretin based therapies is lacking. Existing models largely identify sarcopenia already present and do not incorporate early treatment response. A further gap concerns coordinated care: physiotherapists and dietitians have complementary roles, yet unclear responsibilities and fragmented referral pathways can limit collaboration. This research rig addresses these gaps by developing and validating a clinical prediction model and translating it into a shared care pathway. The model will estimate the risk of new-onset sarcopenia within twelve months of treatment initiation. It will provide a baseline estimate and update it after three months using the observed treatment response.

A multicenter prospective cohort will recruit approximately 300 adults aged forty years and older. Assessments at baseline and after three, six, and twelve months will measure muscle strength, body composition, physical performance, nutritional status, and treatment characteristics. Model development will use prespecified predictors and multivariable regression. Internal validation will assess discrimination, calibration, and potential clinical usefulness. The model will then inform a decision-support tool for physiotherapists and dietitians. Clinical scenarios, questionnaires, and interviews will examine its acceptability, feasibility, and implications for referral decisions and professional responsibilities. These findings will guide refinement of the tool and care pathway.

The study's innovation lies in linking risk estimates updated through early treatment response to a clinical outcome combining muscle strength, mass and physical performance to coordinated care. It aims to enable earlier risk identification and guide targeted nutritional and physical support, helping preserve function and independence during weight management and diabetes care.



Credit: Roy Netzer - AI-generated illustration of the planned research



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עיצוב גרפי: אלי