

Lior Noy, PhD

Computational and creative interactions

RESEARCH BRIEF

Exploration and discovery processes are central to human development at different levels: individuals (e.g. in learning), dyads (mother-infant relationship), groups (ideation processes) and larger systems (discoveries in science, art and technology). I study the basic principles underlying the dynamics of exploration and discovery. I do so by distilling complex human interactions into simple experimental settings that allow computational analysis of behavior and modeling its dynamics.

For example, during a post-doc in Harvard Medical School, I developed a novel paradigm for quantitatively studying joint improvisation, the mirror game, in which two people co-create synchronized and dance-like motion. Using this paradigm I found a basic mechanism of joint improvisation: a dynamic of switches between two states: a reactive leader-follower relationship and a co-predictive state of agreement. The mirror game paradigm is making inroads in social neuroscience and developmental psychology and is being developed as an assessment and treatment tool for people with schizophrenia and autistic spectrum disorder.

My current research interests include: developing computational paradigms for studying creative exploration in small groups; connecting these paradigms to different fields in the behavioral and cognitive sciences; creative human-agent interactions. My long-term goal is to develop a computational science of creative collaboration.

PUBLICATION METRICS

16 cited publications, 532 citations

H-Index = 11, average 3-year citations rate = 96 (2018-2020)

(see full list of publications below)

EDUCATION

1997 B.Sc. in Computer Science & B.A. in Psychology (Tel-Aviv University)

2004 M.Sc. in Computer Science (Weizmann Institute)

2009 Ph.D. in Computational Motor Control (Weizmann Institute)

Supervisor: Prof. Tamar Flash. Thesis: *From Action to Perception and Back Again*

I studied the transformation of perceived movement to action by studying human behavior (using motion tracking and eye movements) and developing computational models for robotic imitation.

POSITIONS

2009-2010	Harvard Medical School, Postdoctoral Fellow
2010-2012	Weizmann Institute, Postdoctoral Fellow
2013-2016	Weizmann Institute of Science, Senior Intern
2017	Tel Aviv University, School of Business Administration, Lecturer
2018-2020	IDC Herzliya, School of Business Administration, Lecturer
2021-	Ono Academic College, Faculty of Business Administration, Lecturer

ON-GOING RESEARCH PROJECTS & COLLABORATIONS

(1) *Collective story-telling: from human-human to human-agent interaction*

With: Prof Arik Shamir (CS dean, IDC)

We develop an online chat-box to collect short stories created together by two agents. This long-term project has three stages: (1) setup development (2) collecting 20K stories from human-human interactions (3) developing a computational agent that can pass the Turing test in this setup

(2) *Creative music creation with simple HCI*

with: Dr Revital Hollander (computational music), MA thesis: Jonalyn Issacs (IDC)

We test non-musicians' engagement and creativity in new simplified and personalized digital interface for music creation

(3) *Studying the role of secure attachment in joint improvisation*

with: Prof Mario Mikulincer (IDC), Jason Friedman (TAU), MA thesis: Daniel Khanoukov

We use a virtual version of the mirror-game paradigm to test the effect of secure attachment (a fundamental construct from developmental and social psychology) on collaboration and creativity

(4) *Security and Creativity*

with: Prof Mario Mikulincer (IDC), Maor Rosenberg (Phd student, TAU IEM)

Test the effects of security priming and attachment style of creative exploration using an on-line version of the *creative foraging game (CFG)*

(5) *Collective creative exploration*

With: Prof Krisitian Tylen (Interacting Mind Center, Aarhus University, Denmark), Maor Rosenberg (Phd student, TAU IEM)

Extending our computational work on creative exploration (using the *creative foraging game*) to dyadic interactions, in order to understand collective creativity and develop human-agent creative collaborations

(6) *Online Creativity Games using Citizen Science*

With: Prof Jacob Sherson and multiple partners ([Center for Hybrid Intelligence](#), Aarhus University, Denmark)

Developing a suite of online creative game, and collect data from 10K to 100K of participants, building on the current infrastructure of the [Science-At-Home](#) project, with the long-term goal of developing a computational model of human creativity

JOURNAL PUBLICATIONS

(1) [L. Noy](#), R. I. Rumiati, and T. Flash, "Simple movement imitation: are kinematic features sufficient to map perceptions into actions?", **Brain and Cognition**, 69(2), 360–8, **2009** [14 citations]

(2) [L. Noy](#), E. Dekel, and U. Alon, "The mirror game as a paradigm for studying the dynamics of two people improvising motion together", **Proceedings of National Academy of Science**, 108 (52), 20947–52, **2011** [247 citations]

(3) *Y. Hart, *[L. Noy](#), R. Feniger-Schaal, A. E. Mayo, and U. Alon, "Individuality and togetherness in joint improvised motion", **PLOS ONE**, 9 (2), e87213, **2014** [69 citations]

(4) [L. Noy](#), N. Levit-Binun, and Y. Golland, "Being in the zone: physiological markers of togetherness in joint improvisation", **Frontiers in Human Neuroscience**, 9:187, **2015** [60 citations]

(5) [L. Noy](#), U. Alon, and J. Friedman, "Corrective jitter motion shows similar individual frequencies for the arm and the finger", **Experimental Brain Research**, 233 (4), 1307–1320, **2015** [16 citations]

(6) A. Dahan, [L. Noy](#), A. E. Mayo, and U. Alon, "Exit from synchrony in joint improvised motion", **PLOS ONE**, 11(10), e0160747, **2016** [14 citations]

(7) *R. Feniger-Schaal, *[L. Noy](#), Y. Hart, N. Koren-Karie, A. E. Mayo, and U. Alon, "Would you like to play together? Adults' attachment and the mirror game", **Attachment and Human Development**, 18, 33-45, **2016** [20 citations]

(8) G. Gaziv, [L. Noy](#), Y. Liron, U. Alon, "A reduced-dimensionality approach to uncovering dyadic modes of body motion in conversations", **PLOS ONE**, 12(1), e0170786, **2017** [6 citations]

(9) [L. Noy](#), N. Weiser, J. Friedman, "Synchrony in improvised joint action is directed by each participant's motor control system", **Frontiers in Psychology**, 8:531, **2017** [8 citations]

- (10) Y. Hart, L. Rozenkrantz, A. E. Mayo, R. Mayo, A. Tendler, *U. Alon, and *L. Noy, "Creative foraging: An experimental paradigm for studying the dynamics of exploration and discovery", **PLOS ONE**, 12(8), e0182133, **2017** [10 citations]
- (11) L. Rozenkrantz, A. E. Mayo, Y. Hart, *L. Noy, and *U. Alon, "Placebo can enhance creativity", **PLOS ONE** 12(9), e0182466, **2017** [15 citations]
- (12) R. S. Brezis, L. Noy, T. Alony, R. Gotlieb, R. Cohen, Y. Golland & N. Levit-Binnun, "Patterns of Joint Improvisation in Adults with Autism Spectrum Disorder", **Frontiers in Psychology**, 8:1790, **2017** [12 citations]
- (13) R. Feniger-Schaal, Y. Hart, N. Lotan, N. Koren-Karie, L. Noy, "The body speaks: Using the mirror game to link attachment and non-verbal behavior", **Frontiers in Psychology, Clinical and Health Psychology**, 9:1560, **2018** [14 citations]
- (14) Y. Hart, H. Goldberg, E. Striem-Amit, A. E. Mayo, L. Noy, A. Uri, "Creative exploration as a scale-invariant search on a meaning landscape", **Nature Communication** 9(1), 5411, **2018** [4 citations]

BOOK CHAPTERS & CITED PROCEEDING

- (1) L. Noy*, Y. Hart*, N. Andrew*, O. Ramote, A. Mayo, and U. Alon, "A quantitative study of creative leaps," in Proceedings: **International Conference of Computational Creativity**, pp. 72-76, **2012** [17 citations]
- (2) L. Noy, "The mirror game: a natural science study of togetherness," in: **Performance Studies in Motion: International Perspectives and Practices in the Twenty-First Century.**, D. Citron, A., Aronson-Lehavi, S., & Zerbib, Ed., Bloomsbury Methuen Drama, London, pp. 318–327. **2014** [4 citations]

GRANTS

PLAYTrack/Interacting Minds Centre, Aarhus University, LEGO seed fund (2019, 4k euro)
"Investigating collective, creative exploration", with Kristian Tylene (Aarhus University, Denmark)

CNRS, UMR 7023 Prime grant (2019, 6k euro) *"The inter-corporeal genesis of collective creativity"*, with Asaf Bachrach (CNRS, Paris)

Ile de France region DIM, Brain and Mind Initiative, conference grant (2015, 8k euro) *"The Science of Joint Improvisation"*, with Asaf Bachrach (CNRS, Paris)

ISF grant (2012-2015, 200k NIS) *"Studying the physiological processes underlying interpersonal synchrony"*, in collaboration with Yulia Golland (IDC)¹

I was involved in writing Weizmann Institute internal grants for the "Theatre Lab" (2012-2013, 40k usd, from the Braginsky Center for the Interface between Science and the Humanities)

¹ As a post-doc at Weizmann Institute at the time of the writing, I could not (from administrative reasons) to be on officially the grant (which I wrote and ran) as co-PI.

PENDING GRANTS

French National Research Agency (ANR) (417k euro) “*Movement and Affective Interpersonal Attunement for collective creativity and learning*”, with Asaf Bachrach (CNRS, Paris) and Articulation project network

ACADEMIC TEACHING

Course	Institute	Short Description	Program	Years	Number of Groups
<i>The Scientific Research of Creativity</i>	Weizmann Institute	Research seminar	Graduate research seminar	2012	1
<i>Managing for Creativity</i>	TAU, Ono College	Theories and practices for managing creativity	MBA	2017	3
<i>From human-human to human-agent interaction</i>	IDC	Research seminar	BA in communication (digital media track)	2018	1
<i>The Psychology of Ideation and Creativity</i>	IDC	Theories and practices of ideation and creativity	BA in entrepreneurship (mandatory first year course)	2018-2020	6
<i>Innovation and Technological Revolutions</i>	IDC	An introduction to innovation and current disruptive technologies	BA in entrepreneurship (mandatory first year course)	2020	1
<i>Introduction to Digital Innovation</i>	IDC	An introduction to the current digital revolution, with an emphasis on AI and machine learning	BA in business administration (mandatory first year course)	2018-2020	12
<i>Human computation and collective intelligence</i>	IDC	Research seminar	BSc and MSc seminar in computer science	2021	1
<i>AI in the business world</i>	Ruppín	An introduction to AI and machine learning for MBA students	MBA	2020	1