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You can download the sources of this presentation here:
<https://github.com/mxochicale/riots-sth-20200225>

Fully Open Acesss PhD Thesis

RIOTS Club @ St Thomas

25th February 2020 for 1200
at Maisey Seminar Room

Miguel Xochicale, PhD

School of Biomedical Engineering and Imaging Sciences
King's College London

Outline

1. My journey in OA science
2. What tools I use?
3. Who to follow?
4. How to do an OA thesis?
5. Takeaways

INTRODUCTION

My journey as ...

... open-source enthusiast and open-access scientist

- **(2004-2006)** MSc in Signal Processing
Arduino is an open-source hardware and software company
- **(2013-2014)** Research Assistant in Robotics at INAOE
Discovered R and github [github.com/jwf-zz/tdetools]
- **(2014-2019)** PhD student in Robotics at Uni of Bham
Open-access scientist [twitter.com/o_guest]
and open-source enthusiast [github.com/severin-lemaignan]
- **(2019-present)** Research Associate in Ultrasound-Guidance Intervention at KCL
Continuously-integrated Open-source Reproducible TeX
[github.com/rodluger/corTeX]

TOOLS

Free Software

“Free software” means that the users have the freedom to run, copy, distribute, study, change and improve the software



Open Source Software

"The promise of open source is higher quality, better reliability, greater flexibility, lower cost, and an end to predatory vendor lock-in."



My Collection of Scientific Tools

Screenshot of a GitHub repository titled "mxochicale/tools". The repository contains a single file, "README.md", which is the content of this page.

My Collection Of Scientific Tools

This repository presents various tools that I have been using in my journey of becoming a scientist. The tools we use have profound (and devious!) influence on our thinking habits, and therefore, on our thinking abilities

- Edger W.Dijkstra. 1975. How do we tell truths that might hurt?

These are other tools that I am also familiar with:

- R is a language and environment for statistical computing and graphics.
- python is powerful... and fast, plays well with others; runs everywhere; is friendly & easy to learn; is Open.
- LaTeX [\[LaTeX\]](#) is a document preparation system for high-quality typesetting.
- openCV [\[openCV\]](#) Open Source Computer Vision Library
- hik The Hidden Markov Model Toolkit [HTK]
- Foam3, the name produced from the two words FORMula TRANslator
- inkscape free and open source software to create realistic 3D humans
- TensorFlow Open source machine learning and data visualization for novice and expert
- rustbox Create Acoustic Music
- glib The Gesture and Activity Recognition Toolkit
- grt Gesture Recognition Toolkit
- julia Open Source Large Vocabulary CSR Engine Julia
- julia is a high-level, high-performance dynamic programming language for numerical computing
- superCollider is a platform for audio synthesis and algorithmic composition.
- elan Annotations on video and audio resources.

Contact

If you have specific questions about the content of this repository, you can contact [Miguel Xochicale](#). If your question might be relevant to other people, please instead [open an issue](#).



 <https://github.com/mxochicale/tools>

The tools we use have profound (and devious!) influence on our thinking habits, and therefore, on our thinking abilities.

PEOPLE

Olivia Guest



Olivia Guest | Ολίβια Γκεστ
@o_guest

goth • computational cognitive modeling • geek & techish Cypriot • queer • she/they
• pro-#openculture • anti-#properscience • neuroplausible.com

📍 Cyprus 🌐 oliviaguest.com 🕒 Joined October 2015

4,734 Following 7,149 Followers

neuroplausible About

I Hate Matlab: How an IDE, a Language, and a Mentality Harm

Olivia Guest March 17, 2017 77 Comments

Share Tweet

I dislike Matlab not only because it's closed source and not free software, but primarily because limiting education to just Matlab goes on to limit students' and scientists' skills.

Closed Source Means Closed Science

Secondly, Matlab is closed source, proprietary, and prohibitively expensive if you have to buy it yourself. They obfuscate their source code in many cases, meaning bugs are much harder to spot and impossible to edit ourselves without risking court action. Moreover, using Matlab for science results in paywalling our code. We are by definition making our computational science closed.

Many people in the mutually inclusive open science and open software movements hope to see Matlab surpassed sooner rather than later and some even think it is inevitable. By extension, people in these movements tend to think freely deciding to use Matlab (and indeed any closed source software) in science is at least questionable and at most unethical. I believe in free and open software and science, so I am in principle opposed to Matlab's grip on science.



The principles of open science, by Andreas E. Neufeld



https://twitter.com/o_guest

Overview Projects 68 Projects 0 Stars 546 Followers 586 Following 586

Popular repositories

github/github
Home for open source and GitHub communities and resources.
121 19

git
Evaluate the GitHub contribution of a GitHub user.
1 follower 19 stars 10 forks

rethinkit
Comprehending and Computational Programming
Support Network 12 19

neuroplausible
Teaching materials for computational brain models
1 follower 19 stars 19 forks

pygraph
Pygraph is a simple visual network with a simple GUI.
1 follower 19 stars 19 forks

what-is-computational-explainability
What is computational explainability?
1 follower 19 stars 19 forks

383 contributions in the last year

ReScience organization

Reproducible Science is good. Replicated Science is better.

Bordeaux 🌐 <https://rescience.github.io>

Repositories 11 Packages People 25 Projects

rescience.github.io
IndieScience website solutions

1 follower CC-BY-SA-4.0 1 star 21 forks 11 updated 5 days ago

ResScience

The ResScience journal, Reproducible Science is Good. Replicated Science is Better.

journal replication computationalscience peerreview

1 follower 103 stars 16 forks 11 updated 5 days ago

ResScience-submission

ResScience submission repository

1 follower 11 stars 11 forks 11 updated 5 days ago

Top languages

1 JavaScript Python

People 25

25 >



Report abuse

<https://github.com/oliviaguest>

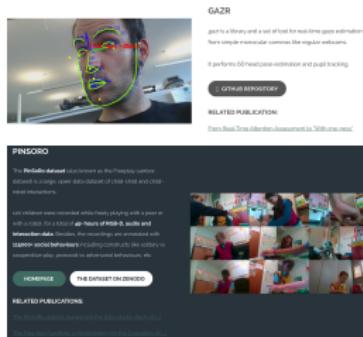
Severin Lemaignan



Séverin Lemaignan
@skadge

Social robots tamer & #AssociateProf in #SocialRobotics and AI @BristolRobotLab
academia.skadge.org Joined April 2009

105 Following 262 Followers



GAZR
gaze, a library and a set of tool for real-time gaze estimation.
Here simple examples on how to register webcams.

It performs 6D head pose estimation and pupil tracking.

[GET THIS REPOSITORY](#)

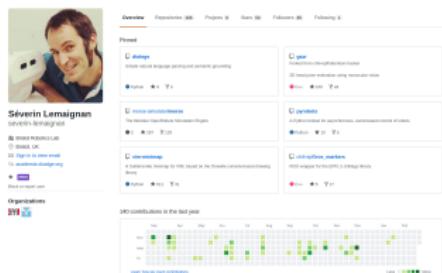
RELATED PUBLICATIONS
This work has been submitted to 70th ICRA 2016.

PINSORO
The **PINSORO** dataset is released as the **Pinsoro** software.
This dataset contains 10 subjects (5 male & 5 female) and 10000 images.
The subjects are recorded while they playing a game of soccer.
The subjects are recorded in a 10x10m2 arena with a resolution of 1080p & 30Hz.
Interaction data: Besides the recordings are annotated with:
- **GOAL**- **SHOOT** behaviors, including contacts with voluntary or involuntary play, preceded by informed behavioral acts.

[HOME PAGE](#) [THE DATASET ON DRIVE](#)

RELATED PUBLICATIONS
Pinsoro dataset, selected for the Best Paper Award at ICRA 2016.
This work has been submitted to the Conference ICRA 2016.

 <https://twitter.com/skadge>



Séverin Lemaignan
Séverin Lemaignan

bio
Social robots tamer & #AssociateProf in #SocialRobotics and AI
at Bristol Robot Lab
Bristol, UK
Email: severin.lemaignan@bris.ac.uk
Joined April 2009

profile
Recent activity (publications, commits, pull requests, issues, milestones, releases)

1 year
Recent commits (publications, milestones, releases)

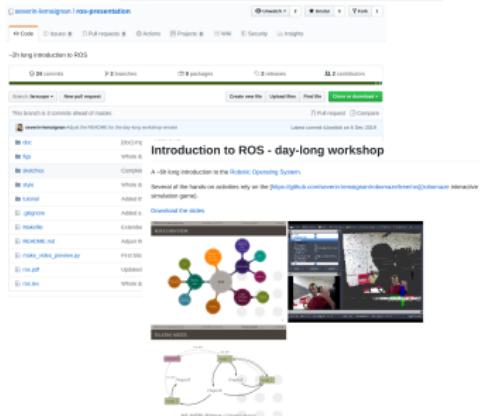
12 pull requests
Recent pull requests (closed, merged, open)

1 commit
Recent commits (closed, merged, open)

1 milestone
Recent milestones (closed, merged, open)

1 release
Recent releases (closed, merged, open)

340 contributions in the last year



severin-lemaignan / ros-presentation

[View](#) [Edit](#) [Raw](#) [Contributors](#) [Issues](#) [Pull requests](#) [Actions](#) [Projects](#) [Tags](#) [History](#) [Settings](#) [Insights](#)

-On long introduction to ROS

24 commits **3 branches** **27 packages** **12 releases** **32 contributions**

[Create file](#) [Upload file](#) [Find file](#) [Create branch](#)

This branch is 3 commits ahead of master.

severin-lemaignan / ros-presentation This branch is 3 commits ahead of master.

ROS **tips** **watched** **COMPS** **Introduction to the ROS (Open) System**

style **style** **style** Several of the hands on audience rely on the [https://gitlab.com/severin-lemaignan/ros-intro-workshop/-/blob/master/ppt/](#).

control **control** **control** Downloaded the slides.

gazebo **gazebo** **gazebo**

mobile **mobile** **mobile**

interaction **interaction** **interaction**

make_video_pioneer.py **make_video_pioneer.py** **make_video_pioneer.py**

ros_tutorial **ros_tutorial** **ros_tutorial**

ros_tutorial **ros_tutorial** **ros_tutorial**

Introduction to ROS - day-long workshop

Downloaded the slides

All slides (including exercises)

 <https://github.com/severin-lemaignan>

Other OA figures

Open Science Advocates



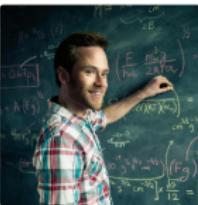
Dr. Rachael Ainsworth
@rachaelainsworth
@Gh�verhead Community Manager & OpenScience advocate @OfficialUAU
| PhD in Radio Astrophysics | > | thephdstudent.org | @TDX Speaker |
she/her
@ Manchester, England | @rachaelainsworth | Joined April 2010
1,084 Following | 1,000 Followers



Ulrich Dirnagl
@ulrichdirnagl
@kscn.org/0000-0003-0755...
@ Berlin, Germany | @ dirnagl.com | Joined December 2009
96 Following | 1,360 Followers



Corin Logan
@corinlogan
Are profiles inspiring because they're flexible? @TheCorinLogan Senior Researcher @MPI_EVA Leipzig. I want to be @ulrichdirnaglscience
@ Leipzig, Germany | @CorinLogan.com | Joined September 2012
1,313 Following | 1,818 Followers



Rodrigo Luger
rodluger
Astronomer at the Center for Computational Astrophysics
@ Flatiron Institute
@ New York, NY
@ https://rodluger.github.io



Björn Brems
@bjornbrems
Professional student of Neurogenetics #neurobiology #neuroscience
@OpenScience_bjorn_brems@lab.brems.net
@ Regensburg | @ brems.net | Joined June 2009
998 Following | 8,073 Followers



Jon Tennant
@jonathan_tennant
Norfolk regular scientist. Latest book: [http://openscience-reviews.com/](#)
@ fossilearth.com | Joined August 2011
842 Following | 17.2K Followers



Rebecca Willén
@beckwillen
Scientist & Psychologist. Founding Director @GOORInstitute. Fan of science, scientists, independence and freedom.
@ Sweden | @ beckwillen.info | Joined July 2012
681 Following | 1,113 Followers

Podcast



Science for Progress - Science Advocacy
@SciForProgress
#Science and #Humanities, and their interaction with #Society and #governance, Podcast and Twitter rotating curation @STmoxiz, @CervinGckneir
@ Germany | @ sciencetopprogress.eu | Joined August 2017
1,547 Following | 3,520 Followers



Clio Science Talk
@ClioScienceTalk
Popular Science, Trade, Debate, Politics, Reports
@ YouTube | @ ClioScienceTalk | Joined January 2016
1,441 Following | 1,441 Subscribers



Everything Hertz
@hertzpodcast
A podcast by scientists, for scientists. Methodology, scientific life & bad language. Hosted by @hertzatene & @benrechhers. Bi-monthly episodes 1st/3rd Mondays
@ Oslo & Boston (via Sydney) | @ everythinghertz.com | Joined February 2016
34 Following | 4,105 Followers

PHD THESIS

LATEX and vector files

LATEX

This screenshot shows a GitHub repository interface for a LaTeX document. The repository name is 'mxochicale-phd / thesis'. The 'Code' tab is selected. A file named 'abstract.tex' is shown, which contains the LaTeX code for the abstract section of a thesis. The code includes sections for 'Abstract', 'Background', 'Objectives', 'Methods', 'Results', and 'Conclusion'. The file is 1.44 KB in size and has 31 lines of code.

```
\begin{abstract}
    \begin{itemize}
        \item The abstract describes the research methodology and objectives.
        \item Nonlinear analysis can be applied to investigate the dynamics of time-ordered data.
        \item Such analysis can reveal several types of variability, including the context of human-robot interaction.
        \item Hence, this dissertation not only explores questions such as How to quantify movement variability and what methods of nonlinear analysis are appropriate to quantify movement variability but also how methods of nonlinear analysis are affected by real-world data (e.g., non-stationary, data length bias, sampling frequency or noise).
        \item Methods are explored to determine embedding parameters, reconstruct state spaces, recurrence plots and recurrence quantification analysis.
        \item Additionally, this thesis presents three dimensional surface plots of recurrence quantification analysis which to consider the vertical dimension of movement and recurrence thresholds.
        \item These show that three dimensional surface plots of Shanon entropy might be a suitable approach to understand the dynamics of real world time series data.
        \item This work also presents a novel approach to implement nonlinear interaction where humanoid robots can be pre-programmed with nonlinear analysis algorithms to evaluate. For instance, the improvement of movement performances.
    \end{itemize}
\end{abstract}
```



This screenshot shows a GitHub repository interface for a vector file structure. The repository name is 'mxochicale-phd / thesis'. The 'Code' tab is selected. A file named 'thesis.svs' is shown, which contains a list of vector files and their commit history. The files include 'sources', 'README.md', and various 'thesis-structure-vX.svgs' files. The commit history shows the progression from 'pre-submission' to 'final version' over 18 months.

File	Commit	Date
sources	pre-submission	18 months ago
README.md	pre-submission	18 months ago
thesis-structure-v01.svg	first draft	2 years ago
thesis-structure-v02.svg	first draft	2 years ago
thesis-structure-v03.svg	thesis draft 1.5	2 years ago
thesis-structure-v04.svg	thesis draft v1.75	2 years ago
thesis-structure-v05.svg	thesis draft v2.00	17 months ago
thesis-structure-v06.svg	pre-submission	16 months ago
thesis-structure-v07.svg	pre-submission	16 months ago
thesis-structure-v08.svg	[final version] alpha-version	16 months ago



github

Figures embedded with code

fig_3.1

Branch / master	thesis E_code_data code 4_hyp J0 Fig. 3.1	Create new file	Switch branches	Find file	Home
main	marked dependencies and sample for ubuntu20.04				Last commit on Jan 10, 2023
code	[root-owned] alpha-variant				13 months ago
src	tested dependencies and scripts for ubuntu20.04				8 months ago
writer	fixed regression BERTA				13 months ago

fig_3.1/code

Branch	Name	Last Commit
master	thesis / 0_code_data / 1_code / 4_kg_m3 / kg_3.1 / code	Create new file Upload file Read file History
rxnachemdb	[Read-only] alpha-version	Last commit: 03/10/2019 at 7:58 AM
[]	History	[Read-only] alpha-version
[]	A_solvation_system.R	[Read-only] alpha-version
[]	B_alpha_beta_reactions.R	[Read-only] alpha-version
[]	C_boron_HSLR	[Read-only] alpha-version

fig_3.1/src

fig_3.1/vector

Search master	thesis / 0_code_data / 1_code / 4_fp4_k3 / lg_11 / vector	Create new file	Upload files	Print	Logout
	monica@monicas-MacBook-Pro: ~	Laste commit results on 13 May 2013			
	lg_11.vog	[last revision] 8015a	12 months ago		
	version.vog	[last revision] 8015a	12 months ago		

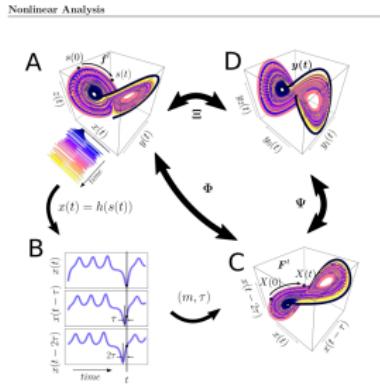


Fig. 3.1 State space reconstruction methodology. State space reconstruction is based on $\pi(t) = h[t](\vec{u}(t)) + h[t]^T[\vec{u}(0)]$ where $h[t]$ is a function $h: M \rightarrow \mathbb{R}^n$ defined on the trajectory $\vec{u}(t)$ of the dynamical system, $f: M \rightarrow M$ is the time- t map, and $\vec{u}(0)$ is the initial condition $\vec{u}(0) \in M$. The time-delay embedding corresponds to Φ , where the original d -dimensional time-delay embedding matrix X of a new state space \mathcal{U} of dimension N Lorenz system (b) Delayed copy of the state space \mathcal{U} (c) Φ Dimensional reconstructed state $\pi(t)$ where Φ is the transformation map. This figure is Quintana-Durán (2012); Ustá et al. (2014).

transforma
Quintana-I
at .

More



The screenshot shows the ResearchGate profile of the thesis. At the top, there's a green circular icon with the text 'Open Access PhD Thesis - Miguel Xochicale'. Below it, the title 'Open Access PhD Thesis - Miguel Xochicale' is displayed along with the subtitle 'Universidad Nac. Autónoma de México (UNAM) · 2014 · DOI: 10.13140/RG.2.2.20000.00000'. The profile includes sections for 'Publications', 'Projects', 'People', 'Topics', and 'About'. A search bar at the top right contains the placeholder 'Type a query...'. Below the search bar, a dropdown menu shows 'Language AA'.

Get utilized private repos

With this feature, you can easily get the ability to create utilized private repos, along with the ability to manage them.

[Upgrade to Team](#)

thesis

This is the first Open-Access and CC-BY reproducible PhD Thesis since the beginning of the ResearchGate platform. It is available online since December 2013. Conceived 2010 (2010). Confirmed 10 June 2018. Final online version 30 July 2018.

CC-BY Open Access Private DOI: [10.13140/RG.2.2.20000.00000](#) Updated on 10 Jun 2018

site

Website of the PhD thesis

[View](#) Updated on 10 Jun 2018

sites

[View](#) Updated on 1 Sep 2018

[openaccessphdthesis-logo](#)

[GitHub](#) [Open Access Health BioRxiv](#) Updated on 21 Aug 2019

blog

[View](#) Updated on 21 Aug 2019



Nonlinear Analysis to Quantify Movement Variability in Human-Humanoid Interaction

Project Institute: University of Birmingham, UK (2014-2020)

Methodology:

- 1. Quantifying movement variability
- 2. Human-Humanoid Interaction
- 3. Human-Humanoid Interaction
- 4. Human-Humanoid Interaction
- 5. Human-Humanoid Interaction
- 6. Human-Humanoid Interaction
- 7. Human-Humanoid Interaction

Skills involved:

- 1. Data Science
- 2. Machine Learning
- 3. Deep Learning
- 4. Signal Processing
- 5. Nonlinear Dynamics
- 6. Human Factors
- 7. Computer Vision

Model methods:

- 1. Hidden Markov Model
- 2. Support Vector Machine
- 3. Recurrent Neural Network
- 4. Convolutional Neural Network
- 5. Gaussian Mixture Model
- 6. Principal Component Analysis
- 7. Hidden Markov Model

Abstract

Dimension analysis can be applied to investigate the movement of live recorded data. Such analysis is related to sensorimotor variability and control of humanoid-human interaction. Thus, this dimension can be any variables such as time to specify movement variability. Dimension analysis can be applied to any movement data such as movement patterns, movement data, movement plots and movement quantification analysis. Furthermore, dimension analysis can be applied to any movement data such as movement parameters and movement dynamics. These data show the movement surface plot of linear movement, right-left movement, up-down movement, forward-backward movement, and movement of movement variability. In general, it provides method of skill learning or skill quantity movement adaptation.

PhD Thesis

Github Repositories

Video Presentation

Citation

```

@phdthesis{mohamed2020nonlinear,
    author = "Muhammad Mohamed",
    title = "Nonlinear Analysis to Quantify Movement Variability in Human-Humanoid Interaction",
    school = "University of Birmingham",
    year = 2020,
    address = "Birmingham, United Kingdom",
    month = "July 2020",
    supervisor = "Dr. Sajid Ali, Dr. David G. Delponti, Prof. Dr. Mohammad Rezaeian",
    doi = "10.24415/ethesis.bham.2020.1000145",
    url = "https://ethesis.bham.ac.uk/1000145"
}

```



[mendeley phd + open access phd thesis logo](#)

for download, website, or request provided
dimensions

100% 200% 250% 300% 400% 500% 600% 700% 800% 900% 1000%

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or request it

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and generate an URL to the [related page](#).

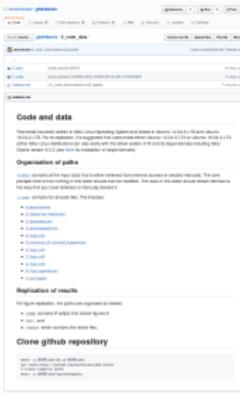
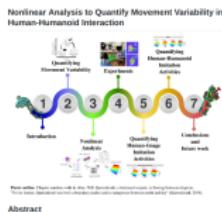
references

[Open Access PhD Thesis logo](#)

FIRST Open Access PhD Thesis at UoB (since 1900)



<https://github.com/mxochicale-phd/thesis>



OA PhD Thesis
* LaTeX project
* Vector files

OA SOFTWARE

* R version 3.4.4 (2018-03-15)

* R packages:

data.table

ggplot2

tseriesChaos

nonlinearTseries

RccArmadillo

* GNU Octave 4.0.2

QA DATA

* Multidimensional
Times-series

22 participants,
4 IMUs (6 axis), and
4 Activities

zenodo

<https://doi.org/10.5281/zenodo.1473140>

Submitted: 26 October 2018/Corrected: 20 May 2019.

Certified: 18 June 2019/Final online version: 30 August 2019.

TAKEAWAYS

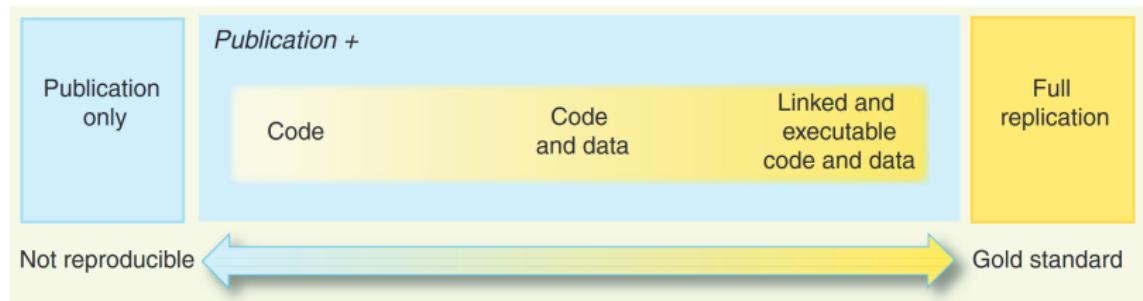
Takeaways

1. Make your work available in a stable, version-controlled repository
2. Choose an open source license to allow adoption and reuse
3. Include instructions and examples of how to cite your software in its

Pushing the frontiers of knowledge is indeed a great challenge but no less important than making such knowledge open accessible and reproducible.



Reproducibility Spectrum



References

-  Xochicale Miguel
» Nonlinear Analysis to Quantify Movement Variability in
Human-Humanoid Interaction «
Open Access Ph.D. Thesis (2019)
<https://github.com/mxochicale-phd/thesis>



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(1) you mention Miguel Xochicale as being the original author, and
(2) you re-share your presentation under the same terms.

You can download the sources of this presentation here:
<https://github.com/mxochicale/riots-sth-20200225>