

ELISAVA

MADD

Final Presentation

20.03.20

Networks

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Asperger Syndrome

1

Motivation of the chosen project

What is it?

:

Developmental disorder
under the umbrella of
the autistic spectrum (ASD)

Obsessive interests
Repetitive behaviors
Irony difficulties
Androgenous traits
Good at analyzing
Problem solvers
Unusual expressions
Hypersensitivity
Eye contact absence
Lack of empathy
Strive for connection

Neurotypicality < *Imitation* Autism

Neurotypicality < *Imitation* ML/AI

Current context

Neurotypicality



Autism ML/AI

Proposed scenario

Neurotypicality

Autism < ML/AI

2

Formulation of the research question/goal/hypothesis

Asperger people mimic neurotypical people
Artificial Intelligence is built upon neurotypical-behavior databases

Hypothesis: Feeding Artificial Intelligence with neurodiverse databases could lead to having more inclusive technologies

A:

Neurotypicality vs Autism/AI (Self Hypothesis)

Asperger Wikipedia
> Network analysis
> Narrative construction

Contropedia

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Neurotypicality vs Autism/AI (Self Hypothesis)

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> Narrative construction

Contropedia

We use the network analysis methodology to obtain results from research and observation.
We explore the topic to better understand its nature and to make an exploratory data analysis.

Network Project Hypothesis:

The conceptual bias of the Asperger Syndrome is closely related to its collective narrative and associated topics

3

Description of the dataset and the construction process

Contropedia is a platform that chronologically stores versions of Wikipedia articles that have undergone diverse modifications.

By accumulating this data, the platform generates a heat map that highlights the words that have suffered more changes, thus, those that are more controversial.

Even though we don't use this dataset to build the network of our project, this phase serves us to understand the contradictions of the topic and our focus on the next steps.

Las personas [[neurotípico|neurotípicas]] o (esto es, sin Asperger (normales) el Síndrome de Asperger) poseen un sofisticado sentido de reconocimiento de los estados emocionales ajenos ([[empatía]]).

Las personas [[neurotípico|neurotípicas]] o sin Asperger (normales) poseen un sofisticado sentido de reconocimiento de los estados emocionales ajenos ([[empatía]]).

Las personas [[neurotípico|neurotípicas]] o no-Asperger sin Asperger (normales) poseen un sofisticado sentido de reconocimiento de los estados emocionales ajenos ([[empatía]]).

Las personas [[neurotípico|neurotípicas]] o no-Asperger (sanas) (normales) poseen un sofisticado sentido de reconocimiento de los estados emocionales ajenos ([[empatía]]).

Las personas [[neurotípico|neurotípicas]] El síndrome de Asperger (CIE-10) o no-Asperger (sanas) poseen Trastorno de Asperger (DSM-IV) descrito por

Las personas [[neurotípico|neurotípicas]] o no-Asperger (sanas) poseen un sofisticado sentido de reconocimiento de los estados emocionales ajenos ([[empatía]]).

Asperger syndrome

"Asperger" and "Asperger's" redirect here. For other uses, see [Asperger's \(disambiguation\)](#).

Asperger syndrome (AS), also known as **Asperger's,** is a **developmental disorder** characterised by significant difficulties in **social interaction** and **nonverbal communication**, along with restricted and repetitive patterns of behavior and interests.^[6] As a milder **autism spectrum disorder** (ASD), it differs from other ASDs by relatively normal **language** and **intelligence**.^[11] Although not required for diagnosis, physical clumsiness and unusual use of language are common.^{[12][13]} Signs usually begin before two years of age and typically last for a person's entire life.^[6]

The exact cause of Asperger's is unknown.^[6] While it is largely inherited, the underlying genetics have not been determined conclusively.^{[12][14]} Environmental factors are also believed to play a role.^[6] Brain imaging has not identified a common underlying condition.^[15] In 2013, the diagnosis of Asperger's was removed from the **Diagnostic and Statistical Manual of Mental Disorders** (DSM-5), and people with these symptoms are now included within the autism spectrum disorder along with **social and pervasive developmental disorder not otherwise specified** (PDD-NOS).^{[6][15]} It remains within the **International Classification of Diseases** (ICD-11) as of 2019 as a subtype of autism spectrum disorder.^{[16][17]}

There is no single treatment, and the effectiveness of particular interventions is supported by only limited data.^[12] Treatment is aimed at lowering obsessive or repetitive routines, and improving communication skills and physical clumsiness.^[6] Interventions may include social skills training, cognitive behavioral therapy, physical therapy, speech therapy, parent training, and medications for associated problems, such as mood or anxiety.^[6] Most children improve as they grow up, but social and communication difficulties usually persist.^[16] Some researchers and people on the autism spectrum have advocated a shift in attitudes toward the view that autism spectrum disorder is a difference rather than a disease that must be treated or cured.^{[19][20]}

In 2015, Asperger's was estimated to affect 37.2 million people globally.^[10] Autism spectrum disorder affects males more often than females, and females are typically diagnosed at a later age.^{[21][22]} The syndrome is named after the Austrian pediatrician [Hans Asperger](#), who, in 1944, described children in his care who were clumsy, and lacking in nonverbal communication skills and understanding of others' feelings.^[23] The modern conception of Asperger syndrome came into existence in 1981 and went through a period of popularization.^{[24][25][26]} It became a standardized diagnosis in the early 1990s.^[27] Many questions and controversies remain.^[18] There is doubt about whether it is distinct from **high-functioning autism** (HFA).^[28] Partly because of this, the percentage of people affected is not firmly established.^[12]

Contents

1 Classification
2 Characteristics
 2.1 Social interaction
 2.2 Restricted and repetitive interests and behavior
 2.3 Speech and language
 2.4 Motor and sensory perception
3 Causes
4 Mechanism
5 Diagnosis
 5.1 Differential diagnosis
6 Screening
7 Management
 7.1 Therapies

Other names Asperger's syndrome, Asperger disorder (AD), Asperger's, schizoid disorder of childhood,^[1] autistic psychopathy,^[1] high functioning autism,^[2] level 1 autism spectrum disorder^[3]



Restricted interests or repetitive behaviors, such as this boy's interest in playing with a toy model of molecules, may be features of Asperger's.

Pronunciation /əsˈpɜːrɡər/,[4] /dʒəˈpɜːrɡər/[5]

Specialty Psychiatry

Symptoms Problems with social interactions, restricted and repetitive behavior^[6]

Complications Social isolation, employment problems, family stress, bullying, self-harm^[7]

Usual onset Before two years old^[8]

Duration Long term^[6]

Causes Unknown^[6]

Diagnosis method Based on the symptoms^[8]

Management Social skills training, cognitive behavioral therapy, physical therapy, speech therapy, parent training^[9]

Medication For associated conditions^[9]

Frequency 37.2 million (2015)^[10]

Contropedia general vision of the Asperger article in its English version.

Contropedia versions of the term *neurotípico* of the Spanish version.

The dataset consists, first, of a seed node –which is the English Asperger article on Wikipedia–, second, the articles that are referenced within the page, and third, the articles that are referenced in the previous ones. Since the edges are connected with a direction associated to them, it is a directed graph. Theoretically, this network should have a centralized

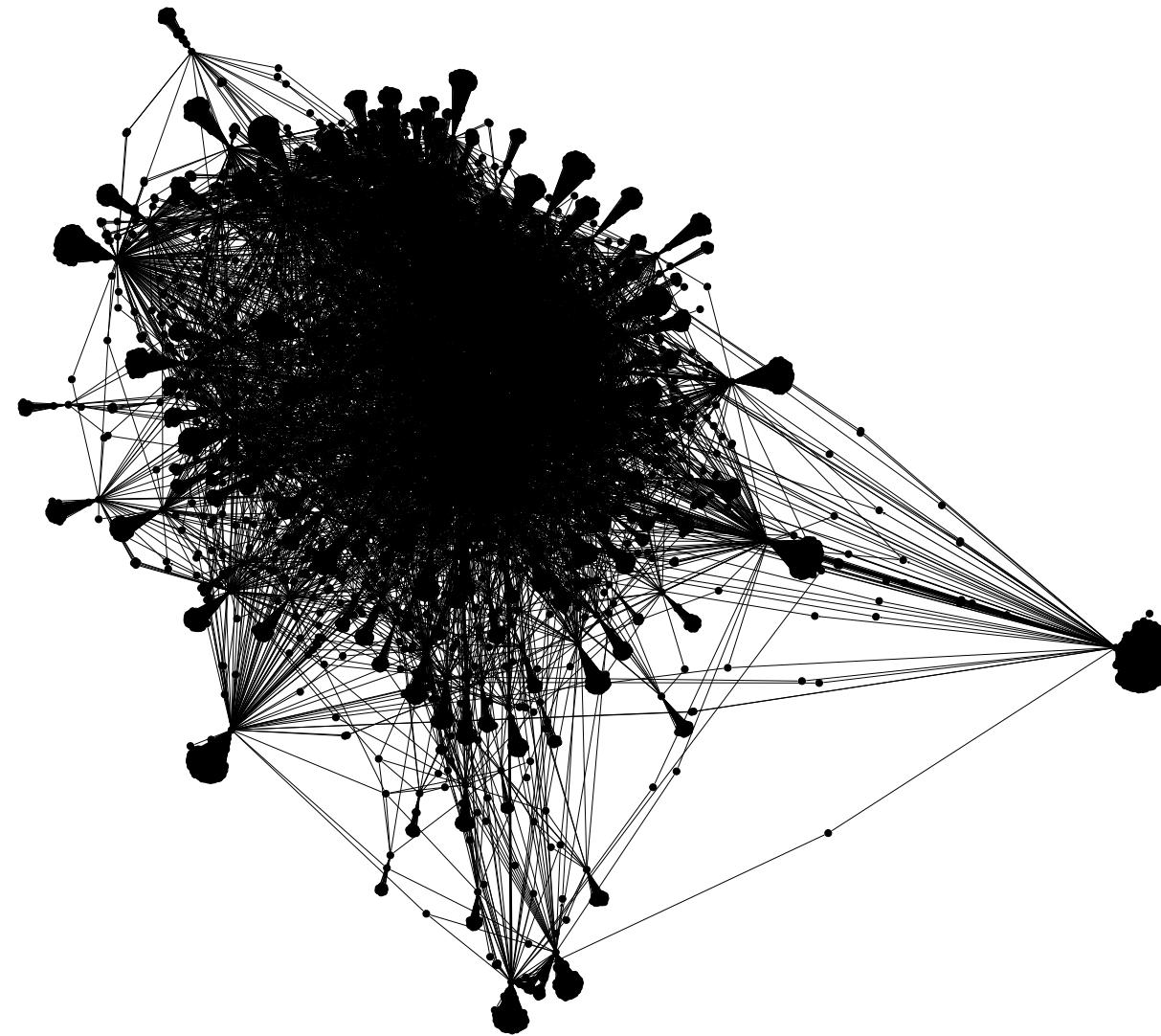
structure, with Asperger at its center. If the external nodes weren't connected among them, the structure would be a double-layer star graph. However, since we know that the other topics are also related between them, we hypothesize that its structure will result in a decentralized network, with nodes that are interconnected between them.

Knowing that one of the hot spots of Asperger is the way it is defined by the general public, we want to explore the topics that are frequently related to it. In that way, we can better understand if the imaginary around it has solid ground. We can then open the debate and wonder to what extent the common-known description of the Syndrome could be challenged.

4

Presentation of results

ForceAtlas 2 Layout
No Statistics / No Filters



<u>Type of network</u>	<u>Layout</u>	<u>Statistics</u>	<u>Filters</u>
Directed	<p>ForceAtlas 2</p> <p>> Threads Threads number: 7</p> <p>> Performance Tolerance (speed): 1.0 Approximate Repulsion: Yes Approximation: 1.2</p> <p>> Tuning Scaling: 2.0 Stronger Gravity: No Gravity: 1.0</p> <p>> Behaviour Alternatives Dissuade Hubs: No LinLog mode: No Prevent Overlap: No Edge Weight Influence: 1.0</p>	<p>Average Degree = 1.573 (to obtain degree filter)</p> <p>Network Diameter = 9 (to obtain centrality filters)</p> <p>Modularity = 0.694 (to detect communities)</p>	<p>> Attributes > Range</p> <p>Degree Closeness Centrality Modularity</p>

Presentation of results

A

Centrality Measures

1st step

Degree Centrality: It identifies the nodes that have more connections/edges with other nodes.

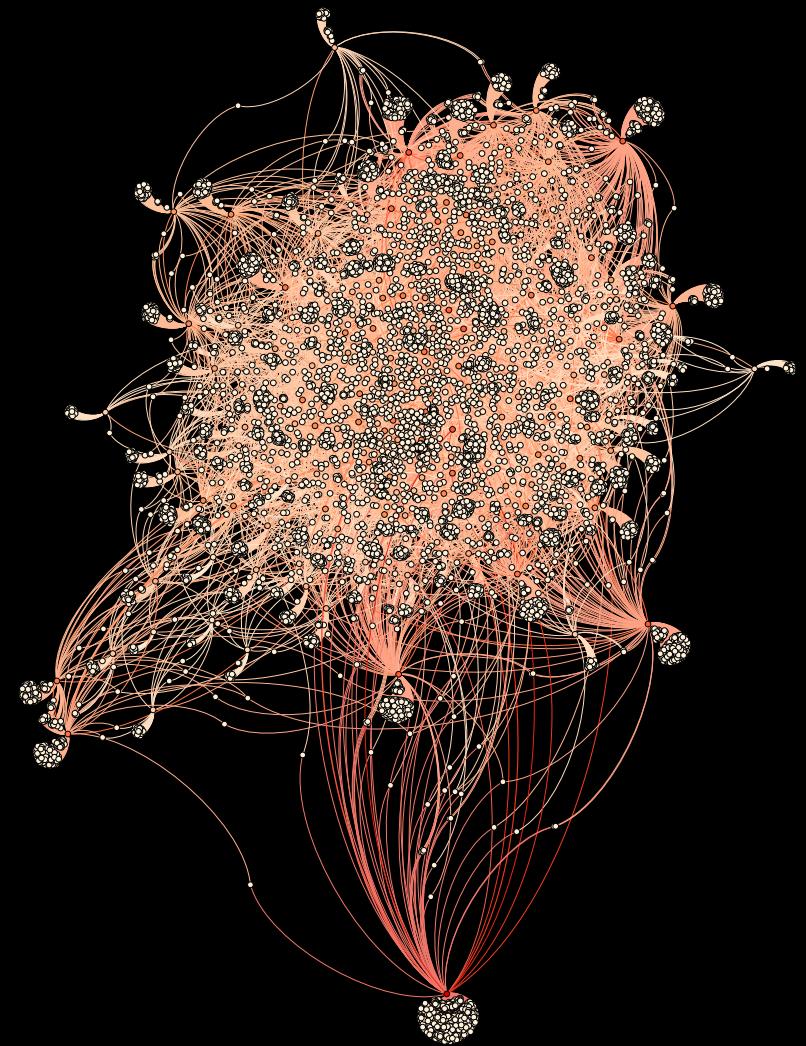
Range: 1 – 826

Nodes > Ranking > Degree (gradient)
Node size: 10

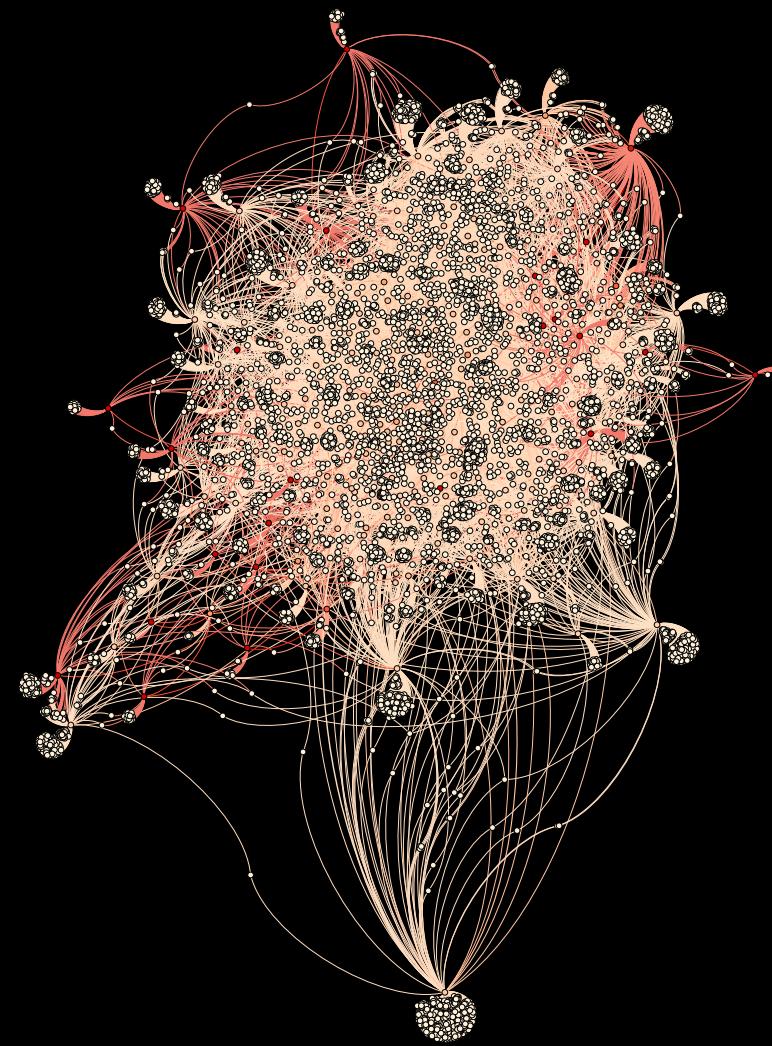
Closeness Centrality: The average distance from a given starting node to all other nodes in the network.

Range: 0 – 1

Nodes > Ranking > Degree (gradient)
Node size: 10



Degree Centrality



Closeness Centrality

2nd step

Degree Centrality: It identifies the nodes that have more connections/edges with other nodes.

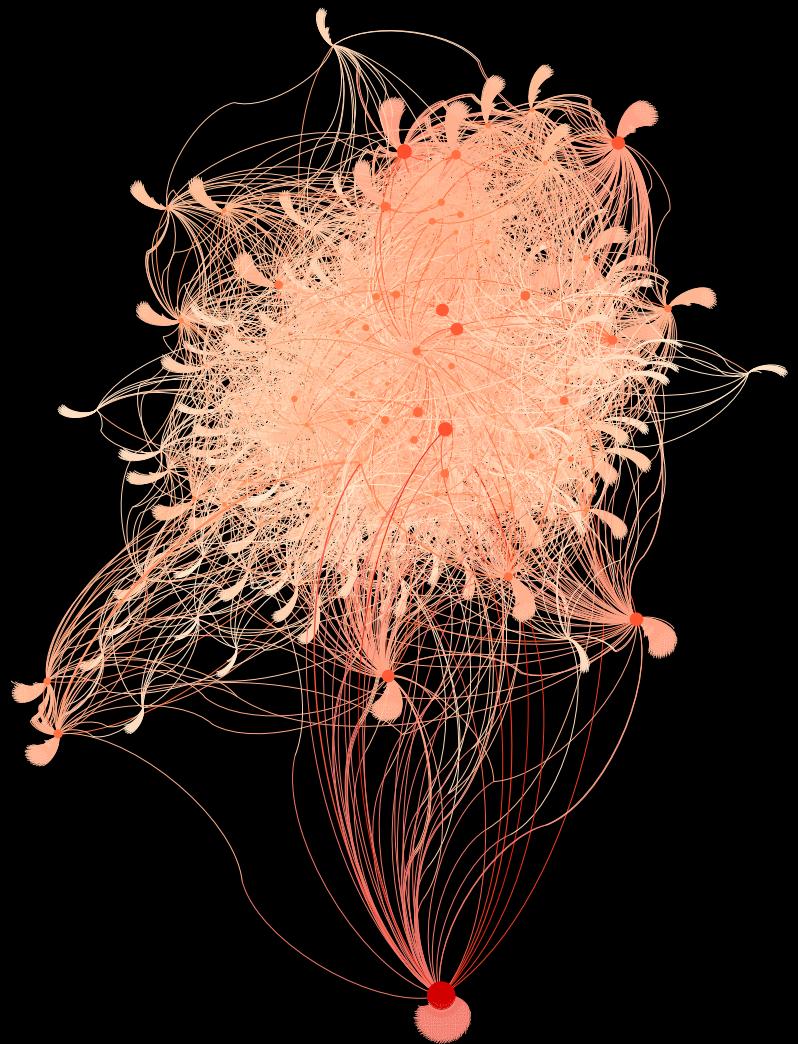
Range: 1 – 826

*Node > Ranking > Degree: Min 1 Max 40
Show Labels (Labels: node size)*

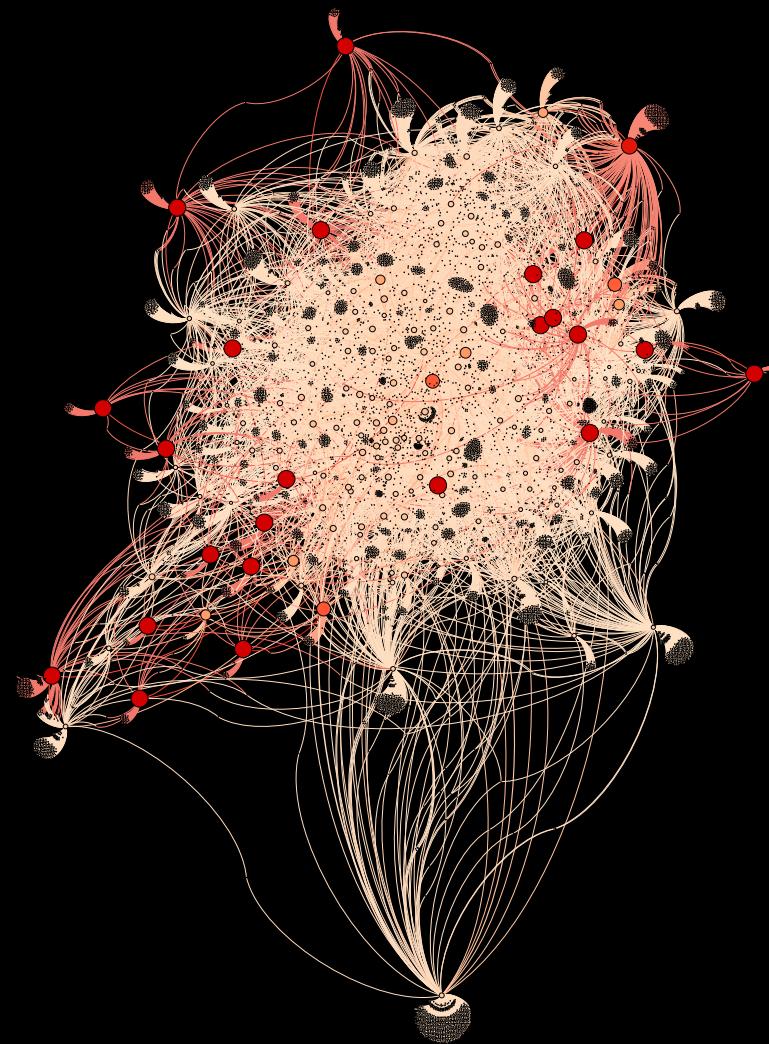
Closeness Centrality: The average distance from a given starting node to all other nodes in the network.

Range: 0 – 1

*Node > Ranking > Degree: Min 1 Max 30
Show Labels (Labels: node size)*



Degree Centrality



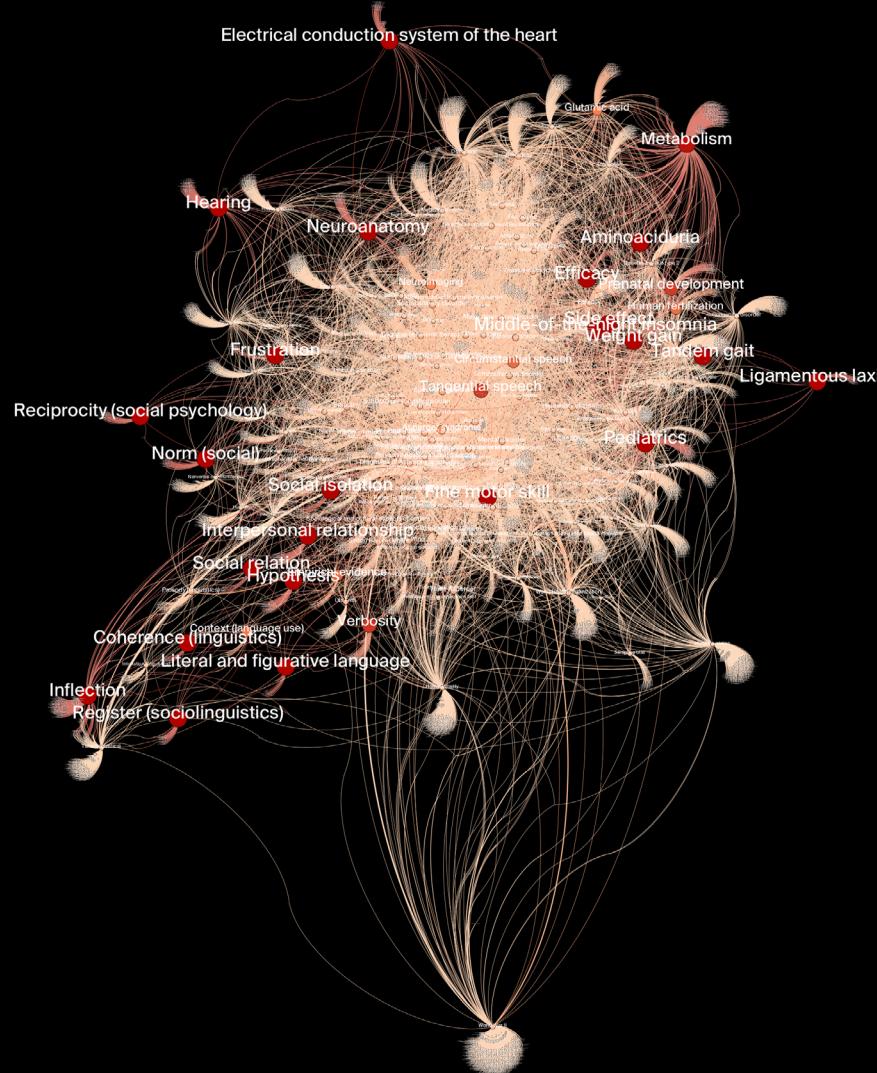
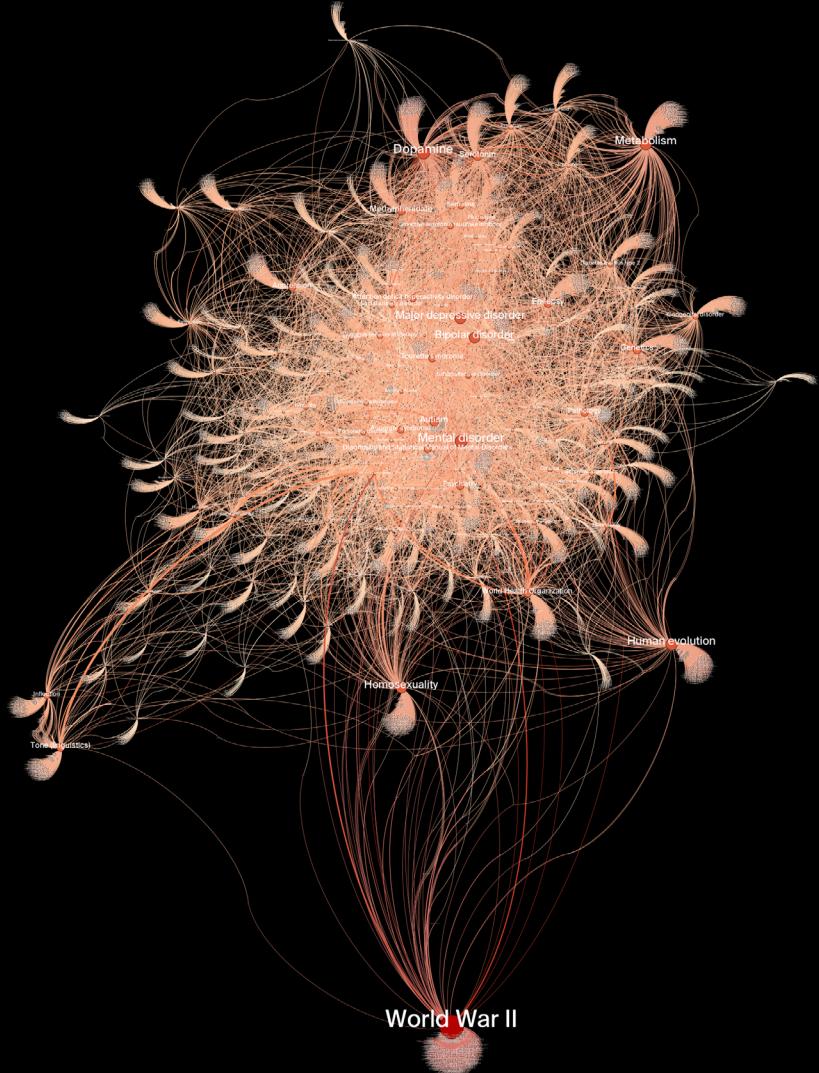
Closeness Centrality

Degree Centrality

World War II
Dopamine
Mental disorder
Human evolution
Metabolism
Homosexuality
Major depressive disorder
Bipolar disorder
Autism
Epilepsy
Methylphenidate
Genetics
Serotonin
Tone (linguistics)
World Health Organization
Aggression
Psychiatry
Pathology
Tourette syndrome
Attention deficit hyperactivity disorder
Diagnostic and Statistical Manual of Mental Disorders
Asperger syndrome
Inflection
Congenital disorder
Sertraline
Social anxiety disorder
Selective serotonin reuptake inhibitor
Cognitive behavioral therapy
Fluoxetine
Schizoaffective disorder

Closeness Centrality

Inflection
Hearing
Pediatrics
Hypothesis
Interpersonal relationship
Neuroanatomy
Electrical conduction system of the heart
Norm (social)
Register (sociolinguistics)
Reciprocity (social psychology)
Weight gain
Ligamentous laxity
Efficacy
Literal and figurative language
Social isolation
Frustration
Coherence (linguistics)
Middle-of-the-night insomnia
Aminoaciduria
Fine motor skill
Tandem gait
Side effect
Social relation
Metabolism
Verbosity
Tangential speech
Prenatal development
Empirical evidence
Circumstantial speech
Social cognition



Presentation of results

B

Community Detection

Modularity:
community detection

Resolution: 1

Range: 2

Randomize: On

Use weights edge: On

Resolution: 20

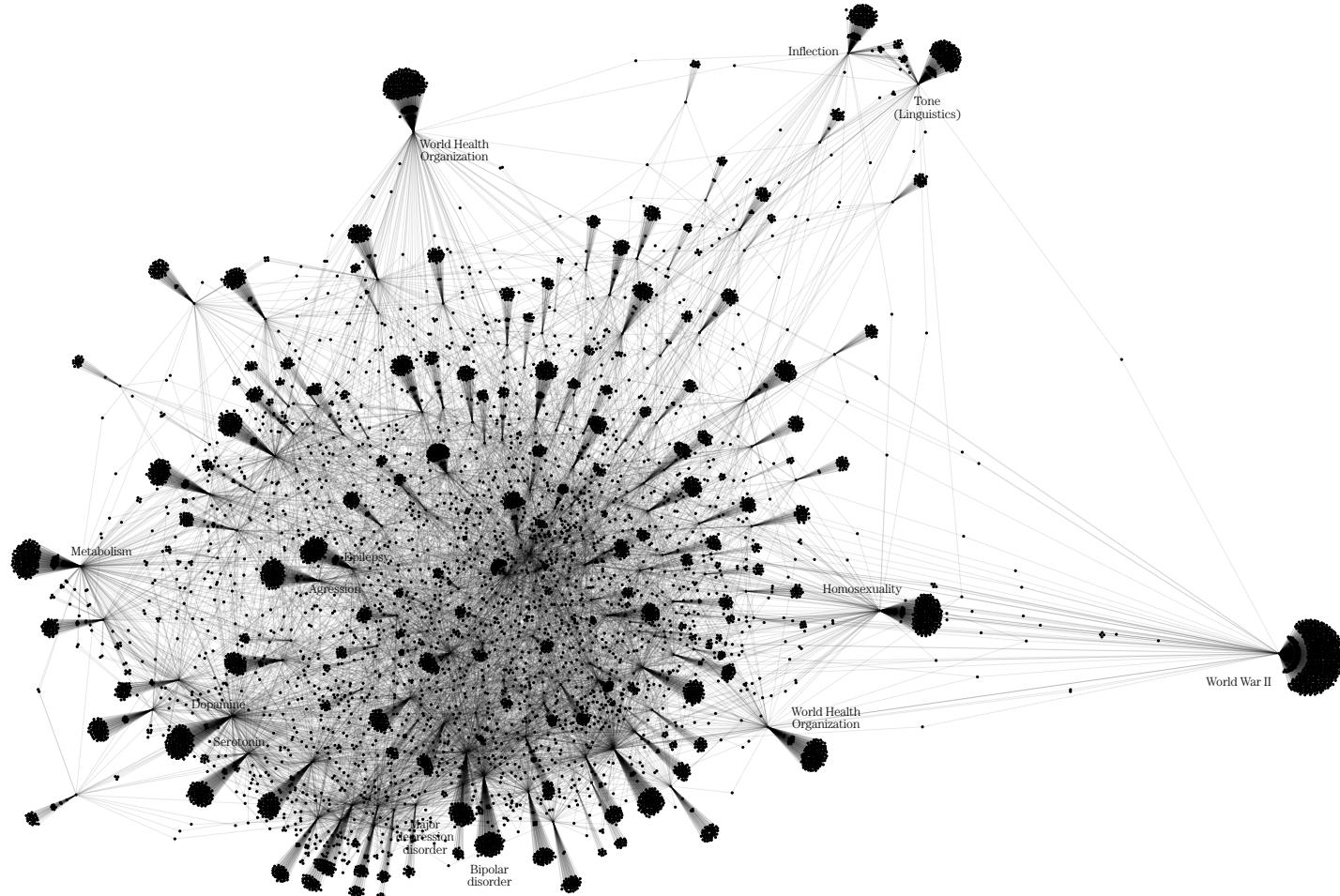
Edge color:(0,0,0)

Edge opacity: 10%

Node color: (0,0,0)

Node opacity: 100%

Node size: 4



5

Discussion of limitations and biases

Network visualization is a useful tool for network analysis. Thus, the parameters used to express a specific kind of information are useful for communication purposes but also embed certain biases. While it is not possible to offer un-biased information, it is useful to acknowledge these biases beforehand.

When it came to network layout choices, we encountered multiple visualization biases. We also reflected on the chosen methods. Find both types of explanations as follows:

– The node positioning in a network is the result of the choice to use a certain layout. That is, nodes can represent variables that make sense for the information that is intended to represent, but they can also be the result of a random software choice. For example, in our case, one of the clearest examples is World War II, which is a node that appears far away from the rest of the network. This means it has a high degree of degree centrality but a low degree of closeness centrality. Hence, there are numerous connections from the node that directly go to other nodes, but the cluster is not necessarily well connected with the rest of the nodes within the network. Visually, this connection gains a lot of importance and it could lead to a misleading interpretation of the network's structure. It could seem like this branch is more important than others just because the negative space that surrounds it makes it look highlighted.

- In order to better differentiate the degree betweenness, we have used a ranking method with gradients that have been purposefully altered (increasing the percentage of red in a beige-red gradient). We must acknowledge that it does not represent in a perfect scale the achieved results, but it does better differentiate the structure of the network.
- Choosing to give importance either to the edges or to the nodes changes the way we perceive the represented information. In our case, in order to communicate and compare the different degrees of centrality, we have chosen to highlight the edges with a ranking methodology as well as to proportionally increase the size of the nodes, so that we can use these parameters to better understand the information. On the other side, in order to express the modularity of the graph –community detection–, we have opted for giving less importance to the edges and more importance to the nodes, making them have the same size and color so as to visually create clusters.

For our project, we have chosen parameters that could help us identify communities and the importance of those communities within the network.

On the one hand, we have understood which are the nodes that are better referenced –which could also be an indicator of the quality of the articles–, and on the other hand, we have seen which are the connections that are more likely to efficiently spread information to other nodes.

Gephi as a network analysis tool helps us interpret complex databases, and as a network visualization tool, let's us communicate the information in a way that can be understandable and democratized.

4

Proposal for future work

A

Use the detection of communities to have a better understanding of the narrative of Asperger Syndrome collectively elaborated on Wikipedia.

B

Be conscious of the nodes that are crucial within the graph to be aware of the potentiality to challenge the Syndrome's construction.

C

Acknowledge the articles that are can spread information more efficiently.

D

In general terms, use the network analysis methodology to further explore the connections established within a network, eventually comparing the functioning of neurotypicality, neurodiversity, and neuro-artificiality.

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