

A network-based approach for discourse analysis from Laclau and Mouffe's perspectives

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Abstract

The current study provides the possibility of merging Laclau and Mouffe's theory of discourse analysis with network theory to specify an alternative bedstead for studying discourse via a semi-automatic algorithm. To do so, first, considering the text as the discourse of complex system, a semi-automatic algorithm is implemented to transform the interacting linguistic components into a network which is depicted as a graph of vertices connected by edges. Then, some of the graph statistics, e.g. degree, weighted degree, eigenvector centrality, etc., are identified for characterizing the nodes as moments, nodal points, and/or nodal point of identity. Finally, the articulation of the discourse based on the above-mentioned components is studied. The results indicate that the approach is strong enough to pave a way for studying the articulation of the discourse from an alternative view, especially based on Laclau and Mouffe's theory of discourse analysis.

Keywords: discourse analysis, semi-automatic algorithm, moment, nodal point, nodal point of identity, network theory

1. INTRODUCTION

"Dans la langue il n'y a que des différences sans termes positifs", this is what De Saussure (1989, 166) contended about the uncertainty of the components in a way that it leads to consider "relational identity" in language which defines the identity of each component in relation to other components. Besides, Laclau (2005, 68) characterized discourse as "any complex of elements in which relations play the constitutive role". Considering these two arguments, the meaning of each element in the discourse of the text is defined based on its interactive role in a whole and so the meaning of the whole is not defined only by entities but relations as well. This point of view leads us to interpret the text as the discourse of a complex system. Owing to this

fact, we used Laclau and Mouffe's terminology verbatim to lay the groundwork for studying the discourse. On the other hand, the concept of "frame" is taken as a way for the packaging of elements of rhetoric and channelizing the text interpretation.

Recent studies, e.g. Paranyushkin (2011); Mihalcea and Radev (2011); Cameron and Larsen-Freeman (2007); Yadav, Sharan, and Joshi (2014), have argued that the text could be considered as a network of nodes (signifiers) which are related to edges. However, all these studies have prepared ways for text mining and extracting keywords which inspect the text as single frame unity in contrast to multi-framed nature of the text. Moreover, none of these studies adopts an approach for studying the text as discourse.

On the other hand, a number of studies applied the components of Laclau and Mouffe's theory of discourse in their works, e.g. Contu, Grey, and Örtenblad (2003), Bridgman (2007), Walton and Boon (2014), Turcotte-Summers (2015), but they analyzed the discourse either based on a predefined nodal point or top-down model. Furthermore, none of them benefits from a strong approach for finding moments, nodal points and nodal point of identity.

Unlike the above studies, the present research aims to study the text as the discourse of a complex system in a way that the interacting linguistic components form a network which could be depicted as a graph of vertices connected by edges. Furthermore, we used framing for separating a segment from a larger context, organizing the interrelated nature of the text, and categorization. Finally, it could be mentioned that this study designs an algorithm to achieve certain special characteristics of the discourse in the text such as the role of signifiers as focal or peripheral, finding nodal points (pivotal signifier), frequency of their relations with other signifiers, the significance of moments (other important nodes) related to them, and proximity of nodes. The result of this study could pave the way for studying the articulation of the discourse, especially based on Laclau and Mouffe discourse analysis in which the nodal points, moments, and nodal point of identity take a vital role. Moreover, it can be used in text analysis applications and any other study in which finding meaningful categories and the most significant textual components is crucial.

2. REVIEW OF THE RELATED LITERATURE

2.1. Theoretical presupposition

2.1.1. Discourse side

About three decades ago, Ernesto Laclau and Chantal Mouffe, in their outstanding book *Hegemony and Socialist Strategy* presented a theory to study discourse. For them, utterances in discourse are not a randomly put together. Discourse is not subject to anarchy; articulation is liable for the architecture of a discourse (Laclau and Mouffe 2001). Articulation could be defined as "any practice establishing a relation among elements such that their identity is modified as a result of the articulatory practice" (Laclau and Mouffe 2001, 105). In other words, articulation is a process by which signs are welded to form a semantic system (Dabirimehr and Fatmi 2014).

On the other hand, they defined the components of discourse. In this regard, they mentioned that: “The differential positions, insofar as they appear articulated within a discourse, we will call moments. By contrast, we will call element any difference that is not discursively articulated” (Laclau and Mouffe 2001, 105). Moreover, they defined the most important nodes as nodal points. The nodal point is “person, symbol, or concept around which other signifiers are collected and articulated” (Dabirimehr and Fatmi 2014, 2). If we consider discourse as a cohesive galaxy which is articulated around the nodal points, the nodal point of identity is the most significant node which is articulated as a core at the center of galaxy in a way that the gravity of it absorbs all the other moments and nodal points (cited in Dabirimehr and Fatmi 2014). This leads us to consider a number of issues that should be considered in analyzing the intended discourse. In the following part, we will discuss some key linguistic issues applied in the present work, e.g. language as a complex system, network theory as a basis for studying language, frame as the privileging technique, and the cohesive system as the pragmatic pointer.

2.1.2. Linguistic side

Cognition, consciousness, experience, embodiment, brain, self, human interaction, society, culture, and history (Five Graces Group 2009) are all knotted in a system called language. Each one of them adds certain characteristics to this maze-like structure and makes it more complicated. Therefore, this maze-like structure full of linguistic elements makes “large networks of components with no central control and simple rules of operation (which) give rise to complex collective behavior” (Mitchell 2009, 13). But despite this complexity and chaos, there are emergent patterns everywhere – they are not preordained by God, genes, school curriculum, or other human policy (Five Graces Group 2009). These patterns which are channelized by frames could be studied by networks – or graphs.

As Crowcroft (2016) believed, most complex systems are graph-like. Moreover, in order to analyze graphs, we can use network theory which is “the study of complex interaction systems that can be represented as graphs equipped with extra structure” (Baez 2016). These graph-like structures are enclosed and channelized by frames.

A text, a paragraph, a sentence, a phrase, and even a visualized enclosing such as a table or box is a reduced and recorded experience that is locked in a frame. Each one of these units frames the ephemerality of the representation while the whole event displays the enduring permanency of it. Besides, frames allow the patterns in them to be recontextualized to become discursive. Therefore, a frame can be described as “the packaging of an element of rhetoric in such a way as to encourage certain interpretations and to discourage others” (Morgan 2014, 133). Considering all the above facts, the notion of the “frame” which is considered a pivotal point in the present study is a boundary maker which encloses networks and channelizes the interpretation of the reader.

Then, it should be mentioned that in order to specify textual frames, we will inspect the "cohesive system". According to Halliday and Hassan (cited in Mubarak 2014, 225), cohesion is "a semantic concept that refers to relations of meaning that exists within the text and defines it as a text". They identify five cohesive devices: reference, substitution, ellipsis, lexical cohesion and conjunction (cited in Mubarak 2014).

The referencing can be exophoric or endophoric (Bloor and Bloor 2013). Exophoric is situational and refers to outside the text while endophoric is textual and refers to the following text – anaphora –, or previous text – anaphora.

Additionally, substitution is another cohesive device which could be defined as replacing one item with another to avoid repetition. The only difference between substitution and reference is that "substitution lies in the relation between words, whereas reference between meanings" (Bahaziq 2016, 113). Substitution could be nominal, verbal or clausal. Nominal substitution is the substitution of *one*, *ones*, and *the same* with those items that occupy the role of the head of the nominal group. Also, verbal substitution is the substitution of a verb with another one. *Do* is the verb which replaces an item. Finally, *so* and *not* can occupy the place of a phrase which shows the clausal substitution.

When the item is substituted with zero, we call it ellipsis. It is "the process of omitting an unnecessary item, which has been mentioned earlier in a text, and replacing it with nothing" (Bahaziq 2016, 113). Similarly to substitution, ellipsis may be nominal (the noun is omitted), verbal (the verb is omitted), or phrasal (the phrase is omitted).

The fourth type of cohesive device is conjunctions, which are linking devices between sentences or clauses in a text. Unlike all the above grammatical cohesive devices – reference, substitution, and ellipsis – conjunctions express "the logical-semantic relation between sentences rather than between words and structures". There are four types of them: additive, adversative, causal, and temporal. The first type of conjunction, additive, connects components with the same semantic role such as *are*, *and*, *likewise*, *furthermore*, *in addition*, *etc.* Adversative conjunctions, such as *as*, *but*, *however*, *in contrast*, *whereas*, *etc.*, are used in order to show contrasting results and ideas. Causal conjunctions express results, reasons or purpose like *therefore*, *because*, *etc.* Finally, temporal conjunctions express the sequence in successive sentences like *finally*, *then*, *soon*, *at the same time*, *etc.*

The last cohesive device, however, is lexical cohesion which "provides the semantic context for text by giving interpretation to all the elements like words, concepts, and sentences" (cited in Mubarak 2014, 230). It could be reiteration or collocation. In the present study, we defined these two lexical cohesive devices based on Paltridge (2006), Bahaziq (2016), and Mubarak (2014). Therefore, we defined reiteration as near similarity of meanings in the text. The forms of this lexical cohesive device are repetition, synonym, near synonym, general noun, and superordinate. On the other hand, collocation could be defined as "associations between vocabulary items which have a tendency to co-occur, such as combination of adjectives and

nouns, as in ‘real-estate agent’ (Paltridge 2006, 137). Moreover, the expectancy relations, a predictable relationship between a verb and either the subject or object of the verb, could be considered as a kind of collocation (Paltridge 2006).

Finally, as Benvenist believed: “the meaning of a linguistic unit can be defined as its capacity to integrate a unit of a higher level” (cited in Culler 2002, 225). In this view, to analyze a text, it is important to put it in the perspective of hierarchy of integration. Therefore it could be categorized from “signifier” to “discourse” or from “lexeme” to “frame”.

2.2. Related works

Recent studies, e.g. Paranyushkin (2011); Mihalcea and Radev (2011); Cameron and Larsen-Freeman (2007); Yadav, Sharan, and Joshi (2014), have shown that we could consider a text as a system in which large networks of components with no central control and simple rules of operation give rise to complex collective behavior (Mitchell 2009). In this regard, Paranyushkin (2011) proposed an algorithm for identifying the pathways for meaning circulation within a text, and Liu and Wang (2007) and Yadav, Sharan, and Joshi (2014) used network analysis as an approach for extracting keywords.

Unfortunately, Paranyushkin (2011), Liu and Wang (2007), and Yadav, Sharan, and Joshi (2014) considered the passage as a single-frame unity. This single-frame unity is not equivalent to the multi-framed structure of the text. Text consists of phrases, sentences, paragraphs or sections, and passage. Moreover, none of these studies shed light on the discursive side of the text. Finally, even though these studies were novice and innovative, they were not linguistically grounded.

On the other hand, some studies - Contu, Grey, and Örtenblad (2003), Turcotte-Summers (2015) Walton and Boon (2014) – have been implemented on the ground of Laclau and Mouffe’s discourse theory, but most of them provide a groundwork for finding the nodal points and nodal point of identity in a top-down process. Contu, Grey, and Örtenblad (2003) identified the signifier *learning* as the nodal point in the *learning discourse*. Moreover, Turcotte-Summers (2015) considered *student* as the nodal point of identity in the articulation of the discourses of Quebec’s News Media and Printemps Érablé. This aim toward discourse theory leads to a huge problem. These two studies considered the nodal point of identity as something chosen by outer power and not as something articulated, fixed and crystallized by discourse. Differently, Walton and Boon (2014) suggested a framework to analyze the discourse based on Laclau and Mouffe’s discourse theory. Even though this framework was very unique in many aspects, it did not have any special solution for collecting needed data. The present study uses an approach called a network-based approach for discourse analysis to test the claims on the passages taken from an English textbook series from the reading sections of the beginning book of Touchstone textbook series.

3. METHOD

To make the process clear, the procedure is presented in four interrelated and interdependent segments—the Instruments and Dataset, Compilation, Network Formation and Graph Representation; and finally, Network Equipment and Graph Analysis is suggested as a way of analyzing the data.

3.1. Instruments and dataset

In order to write this algorithm, we used python 3.6¹. Consequently, we used some modules in *NLTK* library² such as *NLTK.porter*, *Tokenizer*, *Stopwords*, and *CollocationFinder* in order to do the linguistic operations. We also used two more python libraries called *itertools*³ and *panda*⁴. *itertools* provides a set of tools for combining some variables and *pandas* provides a sort of data analysis tools for importing the data into an Excel file to analyse these data in python environment.

On the other hand, some sorts of user interactions and supervisions were performed to increase the accuracy of the present work. Therefore, it is a type of semi-automatic method. Using the algorithm, we changed the text into the graph. Then, in the second level, we used Gephi 9.2⁵ which is an open-source software for data analysis based on the graph. It is a tool “like Photoshop™ but for graph data, via which the user interacts with the representation, manipulates the structures, shapes, and colors to reveal the hidden patterns. It is a software for exploratory data analysis, a paradigm appeared in the Visual Analytics field of research”(Features 2018). Likewise, it is “an interactive visualization and exploration platform for all kinds of networks and complex systems, dynamic and hierarchical graphs. The advantage of this tool is that graph visualization is easy and it provides different views of the same graph according to the need” (cited in Yadav, Sharan, and Joshi 2014, 598). We also used its metrics and analysis equipment to analyze the graph.

The data of this study is chosen from the reading sections of the beginner's book of Touchstone textbook series. Based on the Cambridge website, Touchstone is an innovative four-level series for adults and young adults, taking students from beginning to intermediate levels (CEFR: A1–B1). We form our network based on the first reading part of the beginning book of this series in three levels: passage, paragraph, and sentence.

¹ Downloaded from <https://www.python.org/downloads/>

² Downloaded from <https://www.nltk.org>

³ The library was installed with pip: `pip install itertools`

⁴ Downloaded from <https://pandas.pydata.org/>

⁵ Downloaded from <https://gephi.org>

The data in our study is compiled in two different levels. At the first level, after opening the cohesive ties, we automatically compiled human-readable data from .txt file into our procedure. After the considered modifications, the machine readable text is compiled into Gephi 9.2 as a .csv file.

3.2. Network formation and graph representation

To form the network, we considered signifiers as nodes and their relations as edges. Moreover, we consider each node as a moment in our discourse. Figure 1 presents a brief outline to make an easy reference about how a network was made out of the text.

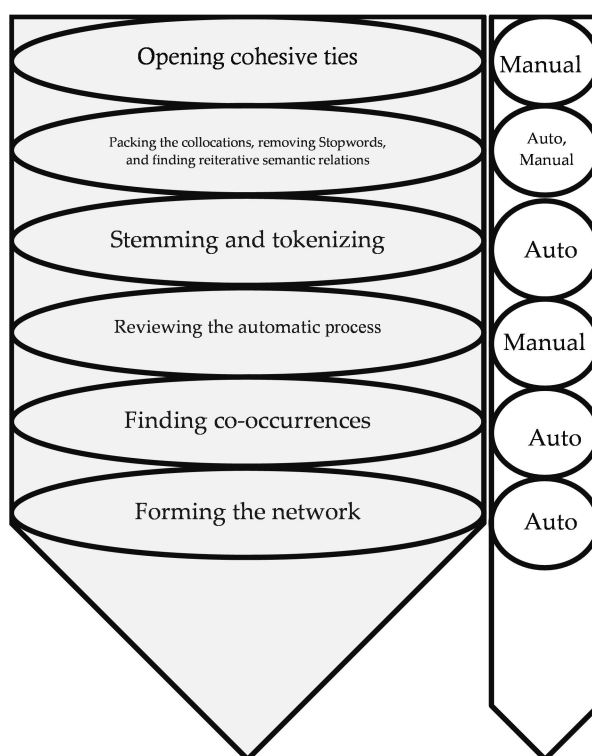


FIGURE 1. THE PROCEDURE OF NETWORK FORMATION.

In the following parts, the stages are explained in more detail:

- 1) **Opening cohesive ties.** In the first stage, the text will be examined to find different cohesive devices – reference, substitution, ellipsis. Then the specified item will be exchanged with the antecedent or deleted word or phrase.
- 2) **Packing the collocations, removing the stopwords, tokenizing the text and finding reiterative semantic relations.** In the second stage, we consider the collocations as lexical cohesive devices. In this way, we conjoin the lexical units into larger units called collocations. To do this, we used collocation package in NLTK library. Meanwhile, the most frequently used grammatical words and conjunctions that participate in binding the text together are removed from it. These are terms without informational value. To remove these words, we used NLTK Tokenize and a modified form of the stopwords

package. We modified the elimination of stopwords in a way that it does not erase the exophors. On the other hand, reiterative semantic relations are found manually. To do this, five reiterative semantic devices - repetition, synonym, near synonym, general noun, and superordinate – are found.

- 3) **Stemming.** Here, stems are used for the remaining words and noun phrases to get to the appropriate morphemes. We used NLTK.Porter in order to stem remaining words.
- 4) **Reviewing the automatic process.** There are many barriers to a fully automatic process. Because of this, a very short review of our steps is very important. Some of these barriers are enumerated below: 1) NLTK Tokenize and Stopwords may eliminate some important concepts. 2) The string written for finding collocations may detect some collocations that are not. 3) NLTK.Porter may stem some words that make a difference in meaning. Considering these points, it is important to review a text again and perform semi-automatic text processing.
- 5) **Finding co-occurrences.** After passing the first stages in which we found nodes, we formed edges based on co-occurrences of concepts (nodes) in three frames or four levels in hierarchy of integration. Figure 2 shows our three frames of co-occurrence. To form our edges, we used *itertools* and *pandas* to inscribe the relations. *Itertools* is a python algorithm that shows the co-occurrences of each unit with other units in our preferred level. On the other hand, *pandas* is the algorithm of the inscription of co-occurrences in a Microsoft Excel sheet.

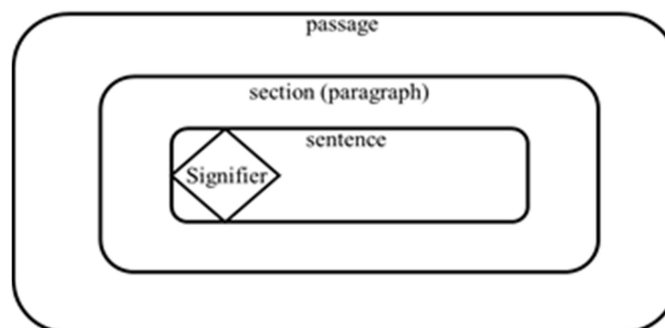


FIGURE 2. LEVELS OF CO-OCCURRENCE AND SIGNIFIER AS A MARKED STRUCTURAL ENTITY.

- 6) **Forming the network.** To make our graphs, using *pandas*, we import our spreadsheets into *Gephi*. Considering the co-occurrences in each level, we formed a network for each passage using *Gephi 9.2*.

Considering the above algorithm, we formed three spreadsheets – sentence, paragraph, text - which cover the collocative and grammatical side of the study. On the other hand, semantic cohesive devices could be extracted manually from the text and set as pairs in spreadsheets.

3.3. Network equipment and graph analysis

Gephi 9.2 presents many important measurements. The significance of a node can be judged in two ways. Firstly, how much of the network resources flow through this node? Secondly, how critical is the node that flows? Moreover, finding a way to separate and recombine the nodes meaningfully is important. Therefore, at first, we will answer the first two questions by defining different graph metrics. Then, we will present Newman's modularity as a way to separate and recombine the nodes.

3.3.1. Nodal significance metrics

- 1) **Degree:** The node degree is the number of relations (edges) of the nodes (Degree 2017).
- 2) **Weighted degree:** The weighted degree of a node is like the degree. It is based on the number of edges for a node but averaged by the weight of each edge. It is doing the sum of the weight of the edges (Totet 2013).
- 3) **Closeness:** It indicates how close a node is to any other nodes in the network, that is how quickly and easily can the node reaches other nodes in the network, and how accessible every other node in the graph is from the considered node (Khokhar 2015, 124).
- 4) **Betweenness:** It describes the node role as a connector or bridge between other groups of nodes. Furthermore, it is defined as "the number of shortest paths from all the vertices to all the other vertices in the network that pass through the node in consideration"(Khokhar 2015, 124).
- 5) **Prestige measurement:** It can be described as how significant a node is based on the significance of the nodes it is connected to. So instead of looking at the number of connections a node has, it is more interested in the value of those connections. One way to capture this is eigenvector centrality, especially when the graph is one way. Based on the concept that connections to highly connected nodes contribute more than connection to nodes with a low degree of connectivity, it assigns relative scores to all the nodes in the network (Cherven 2015, 196).

3.3.2. Newman's modularity

Newman (2006) defined modularity as the difference between the number of edges within the partitions found and the number of expected edges in these partitions if the network were produced by placing edges at random between vertices of an equivalent degree distribution. Moreover, McSweeney (2009, 3) defined it in a simple term:

Real world networks have been shown to separate into logical clusters in which nodes are tightly connected to each other but only loosely connected to nodes outside of their module. Newman's modularity is currently the most widely used metric to measure how modular a network is.

Finally, Newman's modularity in Gephi is highly hooked on the concept resolution which "depends on the degree of interconnectedness between pairs of communities and can reach

values of the order of the size of the whole network" (Fortunato and Barthelemy 2007, 1). The increase in the value of resolution leads to larger clusters. In this regard, the resolution limit of modularity can reach values of the order of the size of the whole network (Fortunato and Barthelemy 2007). Regarding the above metrics, the modularity metric has the potential to inspect different frames based on the intended resolution value. But it has two shortcomings: "by enforcing modularity optimization, the possible partitions of the system are explored at a coarse level, so that modules smaller than some scale may not be resolved" (Fortunato and Barthelemy 2007, 41). On the other hand, it cannot recognize the components with overlapping characteristics. It means that we cannot specify one component to two different clusters. Therefore, we added these signifiers to the groups manually.

As a final point, in order to interpret these metrics carefully, we transferred them to Excel. The final Excel file would help us organize intended modularity groups (meaningful categories) and compare different nodal significance metrics.

4. EXPERIMENT

In order to execute the procedure, the text is separated from the context by considering the visual framing. Then, to frame our networks, we will apply the steps in network formation and graph representation section on the chosen text. Afterwards, the network will be formed and appropriate measurements for it will be calculated. Consequently, nodal points and nodal point of identity will be determined. Finally, the analysis of the discourse will be presented based on co-articulation of important nodal points with moments and co-articulation of nodal point of identity with other nodal points.

To start the experiment, the illustration of exophora, endophora, and ellipsis is presented in Figure 3. Then, based on the presented procedure, the specified items will be exchanged with the antecedent or deleted word or phrase. For example, we replaced the word *Rio* with the word *Rio de Janeiro*.



FIGURE 3. THE INTENDED TEXT FOR ANALYSIS WITH SPECIFIC COHESIVE MARKS.

The next step is finding collocations, tokenizing, and removing stopwords. Box 1 shows the tokenized text by considering collocations, stemming, and stopwords.

```

f = list(['travel guide',
'go', 'great city break',
'go', 'paris',
'go', 'london',
'go', 'new york',
'of course',
'many', 'amazing cities', 'see', 'click', 'find', 'many', 'amazing cities', 'exciting destinations'])

f1 = list(['bogota', 'colombia',
'bogota', 'city', 'contrasts',
'you', 'walk', 'around', 'la candelaria', 'historic neighborhood', 'narrow streets', 'old churches', 'modern skyscrapers',
'you', 'go', 'chapinero neighborhood', 'beautiful park', 'great cafes', 'shops',
'you', "don't miss", 'gold museum', 'beautiful jewelry exhibits'])

f2 = list(['rio de janeiro', 'brazil',
'rio de janeiro', 'famous', 'beaches', 'mountains', 'natural beauty',
'you', 'walk', 'tijuca national park', 'take', 'cable car', 'top', 'sugar loaf mountain', 'amazing views', 'city',
'you', 'join', 'locals', 'head', 'beach'])

f3 = list(['moscow', 'russia',
'kremlin palace', 'saint basil cathedral', 'red square', 'historic sites', 'you', 'see', 'russia capital', 'also', 'tourist attractions', 'city',
'moscow metro', 'the subway',
'full', 'art', 'statues', 'crystal chandeliers'])

f4 = list(['beijing', 'china',
'beijing', 'experience', 'you', 'old', 'new',
'you', 'take', 'tour', 'forbidden city', '600-year-old palaces',
'you', 'visit', "modern olympic bird's nest stadium", 'beijing national stadium',
'you', 'end', 'day', 'traditional foot massage'])

```

BOX 1. THE TOKENIZED TEXT.

After tokenizing the text with the above considerations, we found the reiterative semantic relations manually. Thenceforth, we adopted three strategies. Firstly, we merged the synonym nodes with each other. Secondly, the subordinates and general nouns were inserted in a .csv file with their pairs. Thirdly, when the superordinate or general noun was not in the text, we considered the interactions of the nodes on each other and put them in pairs. The inspected relations in the above text are organized in Table 1.

TABLE 1. REITERATIVE SEMANTIC RELATIONS.

reiteration type		
Synonyms	Moscow metro = the subway modern olympic bird's nest stadium = beijing national stadium Moscow = Russia capital exciting destinations = amazing cities La Candelaria = historic neighborhood	
Superordinate	City (inside the text)	Paris, Landon, New York, Amazing cities (*2), exciting destinations , Bogota (*2), Rio de Janeiro (*2), Moscow, Russia capital, Beijing
	tourist attractions (inside the text)	la candelaria, historic neighborhood, narrow streets, old churches, modern skyscrapers, chapinero neighborhood, beautiful park, great cafes, shops, gold museum , beautiful, jewelry exhibits, beaches, mountains, natural beauty, tijuca, national park , cable car, sugar loaf mountain, amazing

		views, locals, beach, kremlin palace, saint basil cathedral, red square, historic sites, moscow metro, the subway, statues, crystal, chandeliers, tour, forbidden city, 600-year-old palaces, modern, olympic bird's nest stadium, beijing national stadium, traditional foot massage, art
	Country (implied)	Colombia, Brazil, Russia, china

Finally, the co-occurrence of each token with other tokens in a sentence, section (paragraph), and the whole text was scrutinized and transferred into a .csv file. The last step, however, is network formation which was implemented by importing .csv files into Gephi.

4.1. Forming the network

Figure 4 shows the generated network and the diagram under it shows the amounts of degree, weighted degree, and eigenvector centrality. Figure 4-a shows the resolution of 0.9 in a graph with the modularity of 0.128. We also used it without randomization and edge weight. Then, we ran degree, weighted degree, eigenvector centrality, and network diameters, e.g. betweenness centrality and closeness centrality, to mark out the significance of nodes. Moreover, there are two types of components in Figure 4-a: nodes and edges. Each node shows a moment because they are general points of partial fixation.

It means that they are articulated as long as the edges, relation with other moments, are possible. Regarding Laclau and Mouffe (2001), they are the differential positions, insofar as they appear articulated within a discourse. Finally, it should be mentioned that eigenvector centrality is shown by color ranking and weighted degree is shown the size ranking.

The important point is that the calculated measure for closeness is equal to 1 for all signifiers. Besides, the calculated measure for betweenness is equal to 0 for them. This shows that because the nodes are related to each other all over the network, all of the signifiers are close to each other and none of them can function as a mediator between two other signifiers. In this regard, we eliminated these centrality measures from our analysis.

On the other hand, there are three types of edges which demonstrate the three levels of co-occurrences: green edges which show the paragraphs; purple edges which display the passage; black edges which show the sentence. On the other side, Figure 4-b shows the amount of degree, weighted degree, and eigenvector centrality. It also contains categorizations for the moments in different modularity groups.

4.1.1. Articulation of whole text frame

4.1.1.1. Finding the nodal point of identity, nodal points, and moments

Based on Figure 4-a and b, we can consider the text as a network of nodes and edges in which each node fixates other nodes based on its own special characteristics such as the way that other important signifiers make relation with it, the way that strength of its relations with other nodes (signifiers) takes role and the number of its relations with other nodes (signifiers). Table 2 shows the values related to the seven most important nodal points.

TABLE 2. THE AMOUNT OF EIGENVECTOR CENTRALITY, DEGREE AND WEIGHTED DEGREE FOR THE SEVEN MOST IMPORTANT NODAL POINTS.

nodes	eigenvector centrality (0-1)	weighted degree (0-∞)	degree (0-∞)
you	1.0	1535.0	189
city	0.7769285130128479	387.0	143
tourist attractions	0.6849014494072642	162.0	126
walk	0.6356243770586549	256.0	116
take	0.6029127668447124	250.0	111
see	0.5822067227165771	248.0	107
go	0.5813008849442354	588.0	108

Based on the diagram in Figure 4 and Table 2, *you*, which is an exophor and refers to the audience or readers, has the highest eigenvector centrality and weighted degree. It is articulated at the center of the diagram and could be considered as the nodal point of identity. The layout Force Alter 2 creates a foundation for positioning the nodal point of identity at the center of the diagram. This layout paves the way for deducing the fact that as much as a moment is near the center, it is more influenced by the nodal point of identity on one hand and it is more influential in articulating the identity of this master signifier on the other. This is because of the fact that the distance between *you* and other signifiers in this layout is calculated based on the edge weight.

Moreover, by extending our scope, the second set of important signifiers, e.g. *city*, *tourist attractions*, *walk*, *take*, *see*, and *go* appears. These signifiers could be considered as the nodal points in a way that they are the privileging moments. We call all other nodes "moments". Among all nodal points, the signifier *go* is the nearest signifier to the central signifier *you* which shows that it has the weightiest relation with *you* among all other nodal points. On the other hand, the nodal point *tourist attractions* is the farthest moment to the nodal point of identity. This fact shows that peripheral nodes, moments and not nodal points, have more tendency to relate to the nodal point *tourist attraction*. In this regard, it has an effect on articulating nodal point in a way that it affects peripheral nodes. Finally, the nodal points *city*, *take*, *walk*, and *see* have normal roles in forming the nodal point of identity.

In each of these nodes, when the weighted degree increases, so does the eigenvector centrality. But this is not a general rule. There are some nodes with high eigenvector centrality and low weighted degree in cluster No. 2. This shows that all nodes (signifiers) with a great number of strong edges do not necessarily have strong and certain relations with other significant nodes (signifiers). On the other hand, some nodes with a low number of strong edges could have higher eigenvector centrality or relation with significant nodes.

In order to provide a better understanding of this section, we set the obtained values for six nodal points and a nodal point of identity in Table 2. In this regard, we extracted the eigenvector centrality, weighted degree and degree from Gephi and put them in this table. Then, we delineated the significant role of each one of these nodes.

4.1.1.2. Articulation of nodal points and moments

The articulation of *you* as an exophor referred to the audience or readers can provide the sense of "a life in common" in a mediated schedule. It refers to a geographically dispersed audience to establish a diasporic community.

Articulation of Nodal points go, city, see, tourist attraction, walk, and take

In order to show the articulation of seven most important nodal points, we prepared Table 3 in a way that strangeness of the relation between each nodal point and the co-articulated moment is shown with its weight, the number of relationship between these two words based on repetition and frame co-occurrence.

TABLE 3. CO-ARTICULATED MOMENTS WITH SEVEN MOST IMPORTANT NODAL POINTS.

Nodal point	Co-articulated moments
you	go (94), city (50), modern olympic bird's nest stadium/beijing national stadium (38), beijing (37), take (36), la candelaria/historic neighborhood (36), many (36), amazing cities/exciting destinations (36), walk (35), see (34)
city	you (50), go (16), moscow/russia capital (11), bogota (11), rio de janeiro (10), walk (9), beijing (8), take (8), moscow metro/ the subway (8), amazing cities/exciting destinations (8), see (8)
tourist attractions	you (16), moscow metro/ the subway (6), go (5), city (5), moscow/ russia capital (5), modern olympic bird's nest stadium/beijing national stadium (4), see (4), la candelaria/historic neighborhood (4), kremlin palace (4), saint basil cathedral (4), red square (4), historic sites (4)
walk	you (35), go (11), city(9), la candelaria/historic neighborhood (8), rio de janeiro (6), take (6), bogota (6)
take	you (36), go (10), city (8), walk (6), rio de janeiro (6), beijing (6), modern olympic bird's nest stadium/beijing national stadium (6)

see	you (34), go (14), city (8), moscow/russia capital (7), amazing cities/ exciting destinations (7), moscow metro/the subway (6)
go	you (94), amazing cities/exciting destinations (18), city (16), see (14), bogota (12), la candelaria/historic neighborhood (12), walk (11), great city break (10), london (10), new york (10), paris (10), rio de janeiro (10), take (10), moscow/russia capital (10), moscow metro/ the subway (10), beijing (10), modern olympic bird's nest stadium/beijing national stadium (10)

Considering this table, the established diasporic community is greatly co-articulated with the nodal point *go*. It is strongly fixed with the moments such as *amazing cities/exciting destinations*, *city*, *see*, *bogota*, *candelaria/historic neighborhood* and a bunch of other cities mentioned in the text. In this way, first of all, this nodal point is articulated with a variety of layouts, landscapes, history, and their “images” or “identities” which form networks of trade and travel by relying on people, information, goods, and capital (Bennett, Grossberg, and Morris 2013). Furthermore, this nodal point is articulated with the nodal point *see* which emphasizes the cultural efficiency of a verbal image. The third nodal point which is articulated with *go* is *candelaria/historic neighborhood* which reminds us of its superordinate *tourist attractions* in a way that tourist gaze is interpreted. Therefore, this nodal point is strongly fixed as international traveling on one hand and confronting with new realities, identities, and images, on the other.

Thenceforth, the nodal point *you* is strongly co-articulated with the nodal point *city* and its polysemous senses which crystalized it as an exciting destination for travelers. Among these senses, the moment *amazing cities/exciting destinations* makes an enticing landscape and alongside important co-articulated moments indicates the creation of new markets, by producing new demands (international travel) or assimilating new communities into the prevalent market (international travel). Moreover, the nodal point *city* is strongly articulated with Moscow/Russia capital, Bogota, Rio de Janeiro, and Beijing which are second and third world countries. On the other hand, Paris, London, and New York, which are famous cities, co-articulate with it weakly. This concentration on the less developed sites rises the idea of tourist strategy. As sociologist John Urry and Larsen (2011, 73) believed “technological changes such as cheap air travel and internet booking systems; developments in capital, including the growth of worldwide hotel groups (Ramada), travel agencies (Thomas Cook) and personal finance organizations such as credit cards (American Express)” could lead to the immediacy of this external concentration on such countries.

The fourth co-articulated nodal point, however, is *walk*, which is co-articulated with moments such as *city*, *la candelaria/historic neighborhood*, *rio de janeiro*, *take*, and *bogota*. This co-articulation sets an array of public spaces which connect strangers through the act of walking. The public person idealized in this usage is “at ease amid the diversity and unfamiliarity typical of cities” (cited in Bennett, Grossberg, and Morris 2013, 308).

The next co-articulated nodal point with *you* is *take* which shows the use as a route or a means of transport. It is co-articulated with *city* and *go* strong enough to make the interpretation of physical communication or modes of transportation possible. In this sense, technology, new modes of transportation, and growth in the capital can pave the way for new needs.

The nodal point *tourist attraction*, however, is the last nodal point which is articulated with *you*, though, weak. In this regard, it could be mentioned that even though the nodal point *tourist attraction* has a focal role in constructing the discourse, it has a peripheral role in constructing the nodal point of identity and is over-determined by it. In this regard, the nodal point *tourist attraction* is privileged because of its relationship with its polysemous senses. Moreover, it articulates strongly with *city* and *go* which fixates it in "both a collection of architectural forms in space and a tissue of associations, corporate enterprises, and institutions that occupy [city as] collective structure and have interacted with it in the course of time" (Mumford 1968, 447) on the one hand, and international traveling and confronting new realities, identities, and images on the other hand.

Articulation of the nodal point of identity

Considering the articulations of the nodal points *go*, *city*, *tourist attraction*, *walk*, *take*, and *see* with other important moments (Figure 4) on one hand and the co-articulation of them with *you* (Figure 5) on the other, the whole discourse in frame articulates the emergence of a new market (international traveling) and distribution of the prevalent market for the target diasporic community with respect to the tourist strategies of its time. In this way, the presentation of the modes of transportation or physical communication which is woven in the advent of technology paves the way for the interpretation of another need. Finally, the discourse presents the image of tourist attractions, new realities, and identities for the mentioned community in a variety of cultural spaces on one hand and walking in diversity and unfamiliarity typical of cities on the other to make immediate prestige for catching tourist gaze. In this way, it encourages the diasporic community to engage in verbal and nonverbal images.

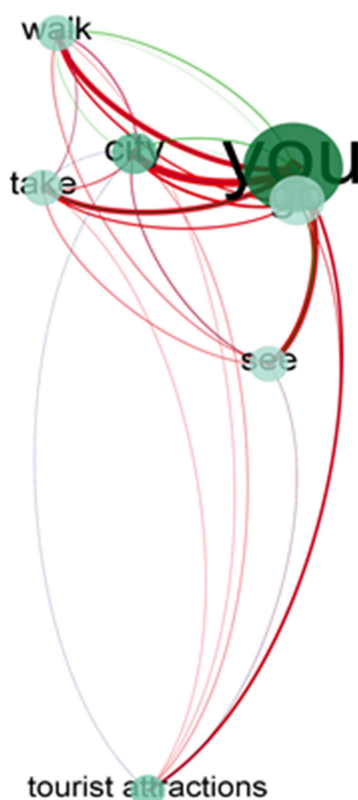


FIGURE 5. THE ILLUSTRATION OF THE NODAL POINT OF IDENTITY IN CO-ARTICULATION WITH SIX MOST IMPORTANT NODAL POINTS.

5. CONCLUSION

It could be stated that the present study may pave the way for studying discourse as a network in which some emergent attributes of language could be measured. In this work, we preferred a semi-automatic algorithm over an automatic one to improve the accuracy of network formation. Therefore, on the one hand, we answered the questions like: How much of the network resources (signifiers) influence the intended node? And how critical is the signifier that flows? On the other hand, we answered questions like: How is discourse articulated in the interaction of moments, nodal points, and nodal point of identity?

In order to answer the first two questions, we opened the cohesive ties, found collocations, stemmed the verbs, tokenized the collocations, and removed stopwords to form the network of the text in three frames – sentence, section (paragraph), and whole text. Afterwards, we improved the functionality of the network based on clustering, finding the nodal points (important signifiers), and nodal point of identity. In this regard, we used Gephi measurements to find the most important signifiers based on different facets.

In order to answer the third question, we used the results of our network analysis on one hand and delineated constituents of discourse in Laclau and Mouffe’s discourse analysis on the other. Therefore, in the present study, we outlined how the moments fix the moments like the moment,

nodal point or nodal point of identity. In this way, the relations of a moment is as important as the moment as a separated signifier.

Therefore, the findings of the present study pave the road for four important implications. Firstly, instead of counting the number of meaningful units of the text or signifiers in passages or paragraphs, or considering them relative to the number of other signifiers in the text, this approach presents a sort of new techniques for finding moments, nodal points, and nodal point of identity. Regarding the above facts, the findings of this study recognized some of the most important constituents of Laclau and Mouffe's discourse analysis. In this way, they could be employed in a critical study of discourse and any other study in which finding moments, nodal points, and nodal point of identity is crucial. Furthermore, considering the algorithmic nature of the present study, by improving the algorithm used in the present study and changing it to an automatic process by improving python strings and codes, it could be used in text mining applications to lay the foundation for new details based on network characteristics. Finally, the present study laid the groundwork for studying discourse in a bottom-up process which brings about the study of discourse from the window of text.

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