

Different Dimensions of Communicative Exchanges in Online Political Talk: Measuring Reciprocity Through Structures, Behaviors, and Discourses

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Reciprocity, a foundational feature to ensure the quality of communicative exchanges, is a subject of extensive investigation in empirical research. However, the absence of a singular and precise conceptualization has resulted in diverse operationalizations across studies. This article identifies and categorizes three distinct approaches to understand and measure reciprocity in online political discourse: (1) by examining interactional structures within discussions, (2) by analyzing users' communicative behaviors, and (3) by exploring the discourses expressed by users. Each form of conceptualization evokes different measurement strategies. By unpacking these components and systematizing the three types, this article offers an integrative analytical framework. To illustrate this possibility, we investigate discussions on Facebook about abortion in Brazil between 2013 and 2019. Our findings emphasize the significance of each dimension and underscore how the absence of one may lead to misdiagnoses regarding the level of reciprocity within a discussion. This nuanced understanding of reciprocity has crucial implications for researchers aiming to navigate the intricacies of online political discourse, facilitating a deeper comprehension of variations in listening and mutual communicative exchange dynamics.

Keywords: reciprocity, interactivity, political talk, online debates, mixed methods

This article introduces a comprehensive and multidimensional framework to conceptualize and empirically assess reciprocity in online discussions. Since the emergence of computer-mediated communication, the topic of reciprocity has attracted continual attention. Empirical studies are fueled by several conceptual trends in social sciences and communication studies, and there is significant accumulated knowledge to measure reciprocity. These developments lead to increasingly more refined and sophisticated analyses. Yet, a difficulty arises because different assumptions and conceptualizations guide operationalization, which involves different methods and kinds of measurements, and it becomes problematic to explain how each account relates to or interacts with one another. Therefore, these

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challenges tend to set these scholarly efforts apart in the field. This article addresses this difficulty and contributes to covering this gap in the literature.

On the conceptual level, this article explores prior assumptions about reciprocity and scrutinizes how these different theoretical constructs are translated in empirical research. It then builds a typology with three modalities of understanding and observing reciprocity. These are (a) reciprocity in the structure of communicative exchanges (measure of the network topology); (b) reciprocity in the user's practical agency (measure of the user's communicative behavior), and (c) reciprocity focusing on the expressed content of communication (measure of substantive meaning carried in the speech acts or discourses). We seek to demonstrate that these distinct dimensions are not separate or incompatible but constitute different components in the dynamics of online communication and levels of reciprocity.

Against this background, we elaborate an integrative analytical framework that enables researchers to conceptually and empirically discern structural reciprocity, behavioral reciprocity, and discursive reciprocity. Although these dimensions reflect the development of the field itself, just a few scholars have conducted investigations of more than one dimension (see Esau & Friess, 2022; Kies, 2010; Mendonça, Freitas, & Oliveira, 2014). We argue that these dimensions deserve to be more widely recognized and fruitfully combined to advance the research agenda on the quality of political debates.

This article begins with a brief overview of the concept of reciprocity, followed by a differentiation of distinct definitions. We then turn to empirical studies to offer an overview of selected variables related to corresponding operationalization in each account of reciprocity. In the third section, we suggest guidelines for an integrated analytical framework. To illustrate the empirical feasibility of the proposed approach, we draw on current studies in the field and our research on online discussion about abortion in Facebook in Brazil, based on data collected over a seven-year period (2013–2019). We point out some limitations of separated accounts/models to explain how they can be articulated in an integrated operationalization. In conclusion, we summarize the implications of an integrated analytical framework to better understand reciprocity as a complex phenomenon in online discussions.

The Three Concepts of Reciprocity

Reciprocity is one of the most long-standing inquiries in online communication, widely studied in the fields of political talk and controversial political issues. Scholars ask whether people actually engage in interpersonal exchanges or merely find spaces to express themselves (Stromer-Galley, 2007). The key concern is to understand if online communication constitutes an authentic dialogical practice and not just monologues (Kies, 2010). However, this can have different meanings in empirical research. The absence of reciprocity could indicate that individuals are not communicating at all or that their communication consists solely of insults or even that they respond respectfully but disregard what others have said. Researchers have explored these diverse manifestations of reciprocal or nonreciprocal communicative exchanges through three distinct approaches.

Taken as a broad sociological concept, the definition of reciprocity rests on a myriad of assumptions about communicative exchange having roots in pragmatism (Dewey, 1916; Peirce, 1878), symbolic

interactionism (Blumer, 1969; Mead, 1934), formal sociology (Simmel, 1908), framing (Becker, 1974; Goffman, 1974), and ethnomethodology (Garfinkel, 1967). Reciprocity is a multifaceted concept (Gutmann & Thompson, 1996, 2002; Habermas, 1996, 1998). Rather than seeking an abstract definition for a complex and non-standardized concept, we believe that extracting working definitions from studies in the field of digital communication, by being attentive to the context in which the term is used, is a more achievable goal.

In this section, our aim is to illuminate and assess different conceptualizations of reciprocity that have been distilled from developments in the literature of digital communication. We propose the following types: (i) reciprocity related to the conversational structure, implying the presence/absence of direct interactions among participants; (ii) reciprocity alluding to behaviors among participants, as how they act with each other; and (iii) reciprocity in argumentative exchange, referring to the substantive content of claims or discourses. Founded on different assumptions (and different variables and measurement strategies), each account of reciprocity offers an important frontier for the concrete investigation of problems identified in the field of digital communication. Surveying these accounts/approaches is theoretically important to clarify the vast set of elements that can be examined in online communication, to better understand multiple dimensions of reciprocity.

Reciprocity in the Network Structure Dimension

The concern with the structure of conversations, that, the presence or absence of interactions and the constitution of responsive networks, is a conventional topic in online communication research. In our study, we call this *reciprocity in the network structure dimension*. The attention here is given to the volume of responses and to whom they are addressed but not to the content or what is expressed in each response. In this line, Graham and Witschge (2003) argue that a discussion can be understood as something “visually comparable to a network, in which all participants are connected to each other through their interactions, their messages” (p. 194). Recently, Aragón, Gómez, and Kaltenbrunner (2017) employed the same terminology to refer to reciprocity as the “directed network of responses between users in each thread of discussion” (p. 14). This dimension can be seen as the most foundational one as it tells us whether there is any kind of direct interaction among users in the first place. The lack of connectivity among users can reveal crucial problems, such as the individual disinterest in building real dialogues (Kies, 2010) and the fragmentation among actors in online spaces (Colleoni, Rozza, & Arvidsson, 2014).

The structural view of reciprocity, despite being fundamental, is often criticized for not allowing us to fully grasp what goes on in communicative exchanges (Esau & Friess, 2022; Janssen & Kies, 2005; Kies, 2010). In this line, Kies (2010) argues that “the strictly structural approach to measuring reciprocity is obviously problematic” as it does not consider whether a message is an actual response to the other participants (p. 45). While attention is placed on the occurrence and volume of responses (or on who addresses whom), no attention is given to what is displayed or expressed in such “responses.” Although people use a reply function in digital settings, they may not actually respond but rather change the subject, ignore previous exchanges, or even just be disrespectful (Esau & Friess, 2022). In this sense, a message reply in a thread can even be characterized as a monologue if the user does not seek to engage with previous messages or replies (Kies, 2010).

Scholars of computer-mediated communication have pointed out that the way users perceive the level of interactivity depends on “how messages relate to one another” and not only the structure of the communication (Sundar, Kalyanaraman, & Brown, 2003, p. 34). In more recent developments, scholars have been usually aware of this limitation. Collins and Nerlich (2015), for example, in their study on connections within a network, make the caveat that their measurements “provide some indications of the degree to which reciprocity exists, but the nature of this interaction requires a more detailed analysis of the content of the comments” (p. 200). Beyond a direct interaction, reciprocity is also a performance that interlocutors must put into action by speaking and engaging with others. That is why we have considered two other dimensions that require a particular focus to better understand reciprocity.

Reciprocity in the User’s Behavior Dimension

Reciprocity implies a dialogical practice when interlocutors engage with and speak with each other. The behavior of participants in a discussion is a key point in understanding the nature and the quality of that discussion, to understand to what extent it is reciprocal or self-referenced. These behaviors are examined from diverse angles in current research. Deliberative theorists, for instance, are usually interested in observing if participants in a discussion seek to understand each other and make themselves understood as a cooperative dynamic. This line of research aims at observing how participants behave in discussions: If they show openness to hearing other points of view, if they show interest in what others have said or have to say, and if they act in a way that builds mutual dialogical cooperation. Parallel to studies on deliberation, computer-mediated communication scholars have been defending a *contingency* view of *interactivity* in which the center of analysis is the users’ behavior in front of others (Sundar et al., 2003). In our study, we call this *reciprocity in the user’s behavior dimension*.

The focus in this dimension is on the sort of relationship established among interlocutors. Measuring reciprocity through behaviors means observing the performance of listening and responding to each other. In a reciprocal dialogue, online users show interest in engaging with those who have expressed previously and those who will engage next. The behavior dimension is essential to understand reciprocity, but like structure, this dimension also has its limits. Interlocutors in a discussion may seem reciprocal, may appear interested in listening to others, but meanwhile ignore the substance of what was said by others. For this reason, investigators should continue to explore the content of statements.

Reciprocity in the Discursive Dimension

Even if users are directly connected (*network dimension*) and showing interest in keeping the conversation going, performatively listening to each other, and maintaining the engagement (*behavior dimension*), it is still possible to find a lack of reciprocity if the *content* shared by different individuals is ignored by others. It is, however, rarer to find studies on reciprocity that analyze how a topic is understood and disputed in substantive terms. More research is necessary to identify the meaning of claims evoked by interlocutors and their effects on interpersonal interactions.

In Habermas’ (2005) theoretical framework, reciprocity is conceived as existing when a discussion participant remains open to interacting with others and considering issues raised by others during a

communicative exchange. Here the concern is not only with the presence of actual responses but with the “willingness of participants to take the demands and counter arguments of others seriously” (Habermas, 2005, p. 384). This implies mutual references on several points in our utterances. In his earlier work, John Dryzek (2000), drawing on a Foucauldian notion of discourse, has also remarked that deliberation can be understood as contestation across discourses rather than the actions of single individuals. In Dryzek’s (2000) words, “the essence of engagement and challenges across discourses is that individuals can be brought to reflect on content of discourses in which they move” (p. 163). Reciprocity can thus be understood as the act of “taking into account [one another’s] arguments and perspectives when making counterarguments” (Mendonça & Santos, 2009, p. 514) or a situation where participants “connect and relate their arguments and claims to other participants’ contributions” (Esau, Fleuß, & Nienhaus, 2021, p. 98).

In our typology, we call this *reciprocity in the discursive dimension*. To explore this dimension, scholars should better focus on the actual meaning of the statement to scrutinize the way the topic under discussion is comprehended and debated. Through a comparative evaluation, the investigator may find distinct levels of discursive engagement, ranging from messages with no reference at all to preceding content to messages displaying high levels of discursive engagement, including all or nearly all ideas shared by former participants. A clarification of terminology might be useful here. There are different ways to focus on meaning. So, to grasp the referentiality of discourses, investigators can use different operationalizations, such as (a) arguments or claims (referring to the substantive meaning of justifications or what has been argued or demanded); (b) discourses (referring to the broader contextual narratives and patterns of speech or text); and (c) frames (referring to the cognitive structures and interpretative frameworks). Each of these requires parallel theoretical treatment.

Different Methods for Addressing Distinct Reciprocity Dimensions

The importance of observing distinct levels of reciprocity and the value of different methodological operationalizations explain our motivation to find a way to articulate different dimensions with more methodological rigor. In this section, we briefly review the most common methods employed in studies about each dimension to pave the terrain for building an integrated framework (for more details about previous studies, see the Supplementary File¹).

Measures of Reciprocity in the Structural Dimension (Topography of Network Interactions)

Two methodological approaches are commonly used to study the structural dimension of discussions online: (a) quantitative analysis, including variables to capture the structural characteristics; and (b) network analysis. In the first case, the investigator observes the proportion of responses and usually identifies if an utterance starts a new thread or responds to someone. (Bächtiger, Shikano, Pedrini, & Ryser, 2010; Jensen, 2003; Kies, 2010; Stromer-Galley, 2007). Take a Facebook post, for example. A comment may be an answer to the post or a reply to someone’s previous comment. Tracking variations of these types of input (comments vs. replies) enables the researcher to discern posts with higher/lower levels of interactions (responses) among users, suggesting therefore more or less structural reciprocity. Going one

¹ Link to the Supplementary File: https://osf.io/yvuad/?view_only=03895039b0dd433d9d9132a24ddb94fe

step forward, it is possible to calculate how many of these replies (or mentions) are mutual, that is, if they continue to address one user to another and vice versa (Cheng, Romero, Meeder, & Kleinberg, 2011; Lee, Chung, Park, & Welch, 2020). Scholars may also observe to whom or to what message an input is addressed (Collins & Nerlich, 2015; Schneider, 1997).

This approach sheds light on particular users or the set of users who receive answers. A scenario where only a few users receive responses suggests low (or even the absence of) reciprocity (Collins & Nerlich, 2015). When working with a broader corpus (i.e., more than one separate discussion), reciprocity can also be measured through the presence of hyperlinks, as indicative of exchanges between two or more spaces (Häussler, Adam, Schmid-Petri, & Reber, 2017). In this context, network analysis is particularly suitable to reveal patterns of interaction, specifying levels, flows, and clusters (Aragón et al., 2017; Graham & Witschge, 2003; Shapiro & Park, 2018). Network analysis can be used either in small or large data sets, the latter involving, for instance, conversational flows in various online pages or connected through hashtags. By means of observation and/or calculation of network parameters and characteristics, investigators can define the network density, the clustering coefficient, and the length of the paths. Broader and more general visual characterizations of networks enable researchers to extract diverse implications (Siegel, 2009). One can observe, for example, actors who monopolize communication and those who remain pulverized (Graham & Witschge, 2003; Shapiro & Park, 2018).

Measures of Reciprocity in the Behavioral Dimension (The Agency of Conversation and Dialogue)

Using content analysis, reciprocity, as a behavior, has been observed widely. Although reciprocity has been described using different terminologies, equivalent categories have been developed, such as *Respectful listening* (Steenbergen, Bächtiger, Spörndli, & Steiner, 2003; Steiner, 2012; Steiner, Bächtiger, Spörndli, & Steenbergen, 2005), *engagement* (Stromer-Galley, 2007), *continuity of critical-rational debate* (Graham & Witschge, 2003), and *contingency interactivity* (Nekmat & Lee, 2018; Sundar et al., 2003). Some scholars explicitly use the term *reciprocity* (Esau & Friess, 2022; Esau, Friess, & Eilders, 2017). All these categories share a common concern, that is, observing if, in a discussion, a participant is in fact acting in a way that performs a response to other participants. These categories intend to capture reciprocity as conversational relationships, characterized by mutual, interchangeable, give-and-take communicative exchanges. Empirical studies have used a number of indicators: The act of asking questions or making further inquiries (Dahlberg, 2004; Stromer-Galley, 2007), offering summarization of previous answers or unleashing meta conversation (Dahlberg, 2004; Stromer-Galley, 2007), and demonstrating interest in convincing others (Esau et al., 2017; Graham & Witschge, 2003).

Measures of Reciprocity in the Discursive Dimension (The Meaning of Claim Making and Claim Receiving)

In the discursive dimension, the content is investigated to apprehend the substance of the discussion, that is, how the issue at stake is being understood and disputed in substantive terms. This can be done, for example, through argumentative analysis, frame analysis, and text analysis.

First, let us consider argumentative analysis. A given argument, that is, “a reason Y why X should or should not be done” (Steiner, 2012, p. 270) carries a propositional content. Observing the substantive content of the justifications allows one to reconstruct topics under discussion and the arguments delivered by actors in an issue-specific controversy. The focus here is the content of the assertion through which the listener can accept, contest, reject, or develop claims in other directions. To operationalize this analysis, investigators usually build an extensive list of pro and con arguments on the chosen topic. Previous studies have mapped arguments of public controversies over abortion (Ferree, Gamson, Gerhards, & Rucht, 2002; Maia & Choucair, 2022), gun control (Maia, 2009), same-sex marriage (O’Connor, 2017), educational policy (Saraisky, 2016) and technology use (Peters, Wessler, Ecker-Ehrhardt, Dereje, & Sindram, 2008). Scholars have examined reciprocity in the discursive dimension by mapping the set of arguments mobilized by different sides of a controversy over time to assess if considerations and responses (counter-argumentation) address concerns to render responses intelligible to meet problems, demands, or criticisms raised by opponents (Maia & Choucair, 2022; Mendonça et al., 2014; Weale, Bicquelet, & Bara, 2012).

Another methodological approach to investigate reciprocity in this dimension is qualitative frame analysis (Maia & Choucair, 2022; Mendonça et al., 2014; Mendonça & Santos, 2009; Mendonça & Simões, 2022). Mendonça and colleagues (2014) distinguish between two types of reciprocity, namely, *direct* reciprocity referring to interpersonal interactions, and *discursive* reciprocity, referring to broader contestation and clash of frames, that is, “how certain discourses collide and respond to each other” (pp. 248–249). According to the authors, “understanding and reconstructing the frames of a debate allows mapping the discursive flows that guide the discussion” (Mendonça et al., 2014, p. 251). In alignment with this perspective, we follow the idea that observing how issues are apprehended and addressed through content in discourses helps to understand whether there is reciprocity regarding the expressed meaning. This requires that participants’ statements exhibit some reference to other substantive views, considerations, or claims to answer questions or move to new explanations.

Developing an Integrated Analytical Framework: Structures, Behaviors, and Discourses

Studies addressing more than one type of reciprocity are still rare in the fields of political communication, media studies, and deliberation. In previous studies, researchers have made strides by integrating data from both the structure and content of online conversations (Balcells & Padró-Solanet, 2020; Esau & Friess, 2022; Lycarião & Alves, 2017; Yarchi, Baden, & Kligler-Vilenchik, 2021). However, dealing with the three levels of reciprocity remains a significant challenge with regard to the very perception of variables and due to difficulties in combining distinct methods. In the previous sections, we argued that conceptual clarity about the dimensions facilitates empirical analytical operations. Here, we take a further step to measure the three levels of reciprocity—structure, behaviors, and discourse meaning—in online discussions. Our comparative scheme also helps investigators to closely address the limitations of single methods and more readily move across distinct sorts of measurements.

We begin by emphasizing the necessity of defining and standardizing the unit of analysis for all three dimensions. In previous research, different measures were rooted in varying units of analysis, such as entire threads, networks, individual users, or even posts. To enable the integration of dimensions

in this case study, we adopted the term “entry” as our unit of analysis, representing either a comment or a reply within the context of Facebook posts. Each entry would then be evaluated (computationally or manually, depending on the dimension) regarding how reciprocal it is in the structure, behavior, and discourse.

Structure

To measure the structural dimension, we classified each entry either as “*Sole Response*” or as “*Response to Response*.”

(a) Sole Response

Such a response occurs when a participant posts a comment or reply within a conversational thread without any prior interaction within the same thread. Essentially, it represents the initiation of a new response within the thread.

(b) Response to Response

This response happens when a participant replies to someone who has previously responded to them within the same thread. This signifies an ongoing, bidirectional connection between two nodes (individual users), indicating a reciprocal relationship and the user’s commitment to sustain engagement within a given conversational thread.

To accomplish this classification, in our research, for instance, we employed a Python script to examine each entry based on two critical conditions. This operation determined whether an entry fit into a “Response to Response” category or a “Sole Response” category, as described here:

- *Previous Response by the Author:* The script checked whether the author of the entry had previously responded in the same thread. If this condition was met, the investigator could assume that the user was responding after being responded to.
- *Order of Entries:* Additionally, the script evaluated the temporal, sequential, order of entries within the thread. If the entry was made after entries from other users (not immediately following entries by the same user), one could assume that the user was actively engaging in the conversation rather than simply posting multiple entries consecutively.

If both conditions were true, the entry was classified as Response to Response. If one or both conditions were false, the entry was classified as Sole Response. Figure 1 shows an example of a thread and the classification for each entry in this dimension alongside a visual representation.

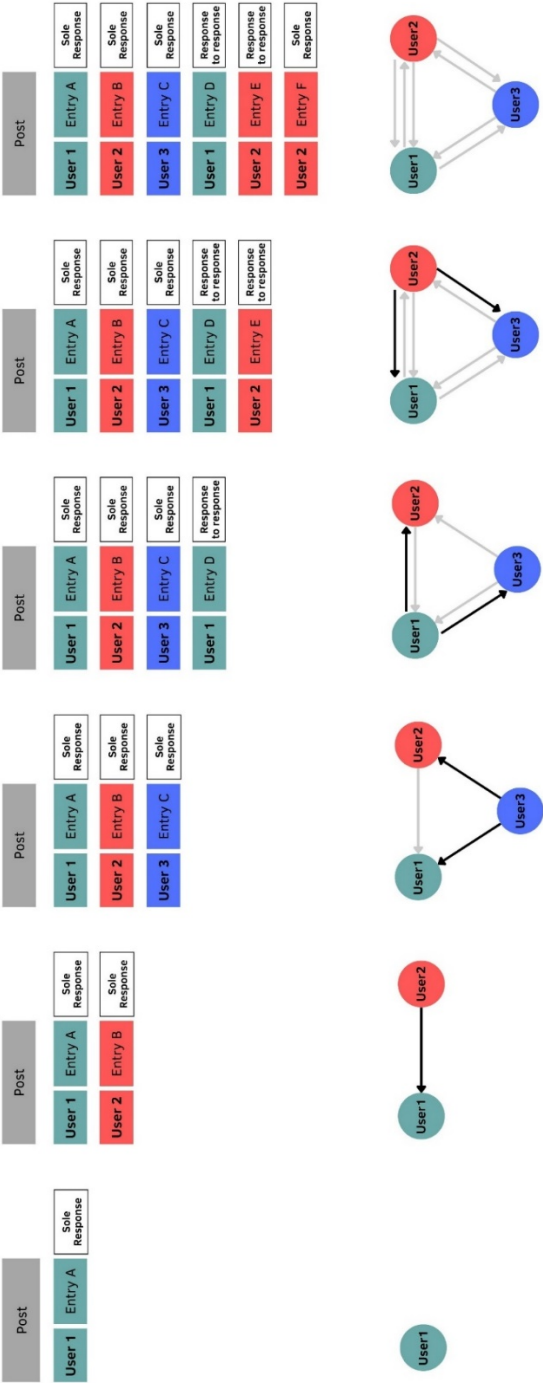


Figure 1. Example of reciprocity in the structural dimension.

Behavior

In communicative interactions, speech acts operate a double function (Austin, 1962; Habermas, 1998; Searle, 1969). Participants in a discussion establish a relationship with each other while communicating about something in the world (Habermas, 1998). In the behavior dimension, we propose addressing how speakers relate to and interact with others (i.e., the agency or action performed and not the substantive content of what is said). We distinguish among four distinct categories: "Refusals," "Monologues," "Simple Responses," or "Meaningful Responses." Each entry is categorized as one of these behavior categories.

(a) Refusals

These occur when users explicitly announce a denial to listen, read, respond, or engage in the conversation. The user may announce that they do not want to talk with the interlocutor, that they will not listen to those arguments, that they will not answer, or that they will leave the conversation.

(b) Monologues

These occur when there is a lack of explicit engagement with others in the conversation. The user's dialogue is self-referential, as if they are speaking to themselves without actively acknowledging other participants.

(c) Simple Responses

Involves users explicitly addressing another participant in the conversation. This behavior indicates that the user is responsive to what others have said, whether through agreement or disagreement with a particular user.

(d) Meaningful Responses

These represent a higher level of engagement. In these instances, users exhibit a clear orientation toward other participants. They actively interact by asking questions, summarizing previously expressed viewpoints, responding to objections, or furthering inquiries. "Meaningful Responses" can manifest in the direction of both disagreement and agreement with the ongoing discussion.

To classify these behavior categories, we employed a content analysis approach following coding protocols and reliability tests (Krippendorff, 2019). The aim of systematic quantitative research is to ensure replicability and generate statistically valid inferences.

Figure 2 shows an example of a thread and the classification for each entry in this dimension. Note that this is a hypothetical example heavily based on some real data from our analysis, but it does reproduce literal sentences in accordance with ethical recommendations for research to avoid identification of users.

Post			
User 1	I support the idea of abortion in cases of sexual violence, such as the situation in this story. It's just not realistic to raise a child conceived in such a disgusting and unscrupulous act. If I were in her position, I wouldn't choose to give birth to the child, and I doubt I could provide the necessary love and care to the baby in that situation. I see there are individuals in the comments who oppose abortion due to its complexity, and I respect their views. However, I hope they'll consider that women should be compelled to carry and raise a child conceived with violence, hate, fear, and disgust.	Meaningful Response	This message is classified as Meaningful Response because: it acknowledges the existence of other comments (showing that they were read); shows awareness of the broader conversation; shows willingness to engage in further discussion.
User 2	Ok.. but I still disagree with you. Life is even more important, this is no reason to kill babies.	Simple Response	The message addresses other user, is responsive by disagreeing with User1.
User 3	I can't believe I'm seeing people talking so much nonsense. I'd rather not read that kind of thing.	Refusal	Clear desire to disengage from the ongoing conversation.
User 1	User2, why would the life of the fetus be more important than the life of the woman who will have to go through this torture, raising a child who will remind her of sexual violence? I'm not imposing my opinion... I really want to understand why you think that.	Meaningful Response	The message actively interacts with other user, raising questions, invites further discussion and debate.
User 2	Unfortunate and biased comparison. Life is sacred. You have to read the Bible, because God protects life above anything else. Abortion will always destroy a life!	Simple Response	The message addresses other user, disagreeing with User1.
User 2	Research shows that 80% of women who give up on abortion say they feel very happy and fulfilled. Article 124: Abortion is considered a crime in Brazil. Performing an abortion on a woman, or consent to its performance, is subject to imprisonment for one to three years. The autonomy of the victims does not cancel out the autonomy of the baby's life, who has no choice.	Monologue	The message lacks explicit interaction with other participants and is self-referential.

Figure 2. Example of reciprocity at the behavior level.

Discourse

Building on the concept of speech acts as dual-function operators, to shift the focus to the discursive dimension, we must look at how the participants communicate about something in the world. In contrast to the sort of relationships established among interlocutors (refusals, monologues, simple responses, and meaningful responses), the focus here is on manifest content, and whether it makes or not references to other content within the thread. This requires, first, the examination of substantive meaning expressed in the entry (how participants understand the topic under discussion) and then a comparative examination of the similarities/differences of references across speech acts. We suggest two steps for performing this operation.

Step 1: Identifying References

A first step was to identify how each entry addressed the political controversy at stake. In our research, following qualitative frame analysis (Entman, 1993), we created categories to classify how each entry addressed the central problem (abortion). According to Matthes and Kohring's (2008) scheme, we

distinguished between a set of “actors” and a set of “topics.” These two fundamental elements (actors and topics) play a crucial role in organizing meaning and defining the central problem within a discourse (Matthes & Kohring, 2008). For example, a comment may focus on the “value of life” (topic) concerning “fetuses” (actor), while a reply to that comment may continue the discussion by addressing the “value of life” (topic) in the context of “women” (actor). We employed a list of eight actors and nine topics to do this analysis, totaling 17 distinct elements. Each entry was coded to determine the presence or absence of references to each of these 17 elements. The coding operation was performed by three trained coders, with reliability tests to evaluate the replicability of the categories, yielding satisfactory outcomes in accordance with the content analysis protocol (Krippendorff, 2019).

Step 2: Calculating Similarity of References

Once the reference was identified, we defined distinct levels of similarity between the references used in each entry in relation to references used in previous entries within a thread (the chain of interactions). We defined the four categories as follows:

(a) Discursively Null

This category applies when the entry contains no references and neither do the preceding entries.

(b) Discursively Nonreciprocal (Zero)

In this category, previous entries include references, but the analyzed entry introduces no similar references, effectively ignoring the content of prior speeches.

(c) Discursively Partially Reciprocal (Partial)

Here, the entry incorporates some of the references used earlier while ignoring others.

(d) Discursively Reciprocal (High)

In the highest level of discursive engagement, the entry uses all or nearly all the references previously employed by other users. This indicates a strong reciprocal engagement with prior speeches and references.

By examining these levels of discursive engagement, the researcher can discern whether participants are drawing on previous statements or discourses to varying degrees or whether they are disregarding previous content within a thread. Figure 3 shows the same example presented in Figure 2, now with the classification for each entry in the discourse dimension. The blue and red boxes indicate the references to actors (red) and topics (blue) made discursively in that specific entry.

Post		
User 1	I support the idea of abortion in cases of sexual violence, such as the situation in this story. It's just not realistic to raise a child conceived in such a disgusting and unscrupulous act. If I were in her position, I wouldn't choose to give birth to the child, and I doubt I could provide the necessary love and care to the baby in that situation. I see there are individuals in the comments who oppose abortion due to its complexity, and I respect their views. However, I hope they'll consider that women should be compelled to carry and raise a child conceived with violence, hate, fear, and disgust.	High Physical or Psychological Damage Autonomy Women Sexual Violence Victims Fetus
User 2	Ok.. but I still disagree with you. Life is even more important, this is no reason to kill babies.	Partial Value of Life Fetus
User 3	I can't believe I'm seeing people talking so much nonsense. I'd rather not read that kind of thing.	Zero X
User 1	User2, why would the life of the fetus be more important than the life of the woman who will have to go through this torture, raising a child who will remind her of sexual violence? I'm not imposing my opinion... I really want to understand why you think that.	High Physical or Psychological Damage Value of Life Sexual Violence Victims Fetus
User 2	Unfortunate and biased comparison. Life is sacred. You have to read the Bible, because God protects life above anything else. Abortion will always destroy a life!	Partial Religious Beliefs Value of Life Fetus
User 2	Research shows that 80% of women who give up on abortion say they feel very happy and fulfilled. Article 124: Abortion is considered a crime in Brazil. Performing an abortion on a woman, or consent to its performance, is subject to imprisonment for one to three years. The autonomy of the victims does not cancel out the autonomy of the baby's life, who has no choice.	High Physical or Psychological Damage Autonomy Value of Life Law Women Sexual Violence Victims Fetus

Figure 3. Example of reciprocity at the discourse level.

Why Does an Integrated Analytical Framework Matter?

Relying solely on one type of reciprocity limits our comprehension of the intricate interplay of reciprocity within conversations. In this sense, the use of a tripartite analytical framework provides more information and enriches the inspection of varying combinations of structure, behaviors, and discourse. A key point here is that finding reciprocity in one dimension when performing a specific case study does not mean that reciprocity in other dimensions will also be observed. It is entirely possible, as we will show in our case study, for an entry to exhibit reciprocity in one dimension while lacking it in the other two or to be reciprocal in two dimensions but not in the third.

Let us say that an entry presents a high reciprocity in terms of structure and behavior, which would suggest, according to conventional measures, an optimal reciprocity. In our proposed measure, if this entry makes no reference to the previously expressed substantive content, either as a reference to a topic or an actor, it is classified as nonreciprocal discursively. If the purpose is to understand whether interlocutors are seriously considering the substance of the previous claims/arguments, we need to be more precise. Serious engagement at the discursive level happens when speakers incorporate previous statements to articulate their own understanding. Discursive reciprocity requires some sort of reference to what has been said by others.

Let us, now, consider a case in which an entry shows good discursive performance, presents dialogic behavior, and, simultaneously, low reciprocity at the level of the network structure. According to our proposed analytical framework, this means that the user is attentive to what was said previously (high discursive referentiality) and is concerned with the dialogical relationship (meaningful responses) but expresses themselves only occasionally at different times or makes only a specific contribution to the topic (a single response). So, high and meaningful discursivity is not to be seen as a continuous and iterative practice in this case.

What we want to stress here is that each dimension of reciprocity has its unique meaning in empirical analysis. Thus, our integrative model (Figure 4) is beneficial for refining strategies to closely observe each dimension of reciprocity as well as to deal with different combinations that emerge in online communication.

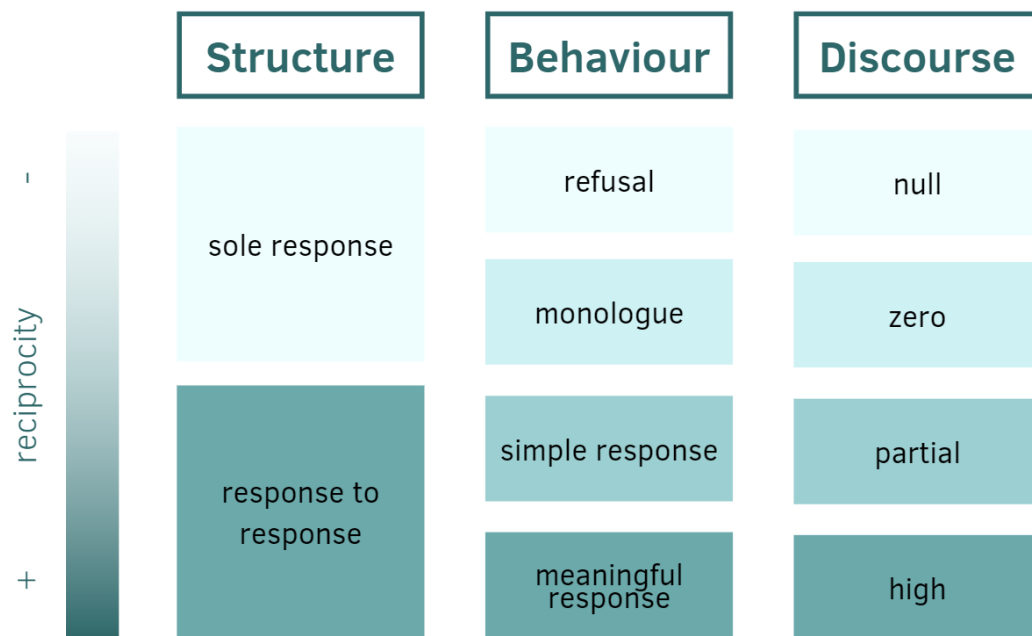


Figure 4. Integrated multidimensional analytical framework.

Case study: Brazilian Abortion Debate on Facebook From 2013 to 2019

To elucidate the interaction of the three dimensions of reciprocity, we now turn to an empirical case: Our research on discussions about abortion on public Facebook pages from 2013 to 2019 in Brazil. Abortion constitutes a traditional case of public controversy, widely used in research on deep disagreements (Ferree et al., 2002; Gutmann & Thompson, 1996; Suiter, Farrell, Harris, & Murphy, 2022). As in many countries, abortion is a topic that recurrently evokes heated discussions in formal and informal settings in Brazil and often generates protests on both sides of the debate. Abortion is considered a crime in Brazilian

legislation, and it is allowed only under three conditions: When the pregnancy is the result of rape, when the fetus is anencephalic, or when the pregnant woman's life is at risk. Due to criminal penalties, clandestine abortions are performed in the country, causing high rates of death among women due to precarious methods and inadequate procedures (Diniz, Medeiros, & Madeiro, 2017). In the last two decades, various bills proposed legislative reform, either to promote the legalization of abortion or to ensure more severe penalties for abortion practices.

We considered Facebook suitable for our research because it was the most used social media platform in Brazil in the last decade. The seven-year period chosen (2013–2019) covers the intensification of conflicts after the Federal Supreme Court's 2012 decision to extend the non-imputability of abortion in the case of anencephalic fetuses. It also includes the massive popular protests from June 2013 until the second year of Jair Bolsonaro's conservative government, in which the fight against abortion was a priority on his electoral agenda. This study aimed to analyze different dimensions of reciprocity in everyday online discussions over a long period. We then formulated the following research questions:

RQ1: Considering the online discussions on the political controversy at stake, what is the distribution of each sort of reciprocity, namely, structure, behavior, and discourse?

We also intended to know if more reciprocity at one level (e.g., structure) also meant more reciprocity at other levels (e.g., behavior and discourse). In other words, we asked if there was any association of one type of reciprocity with others.

RQ2: Is there a correlation, and if so, is it positive or negative among the levels of distinct dimensions of reciprocity?

To collect broad discussions about abortion on Facebook, we followed a multistep process. First, we identified the pages that could talk about the topic. We mapped the pages by searching keywords, reviewing literature about the abortion debate in Brazil, and identifying the pages shared or liked by the pages we had. Second, we collected all the posts about abortion on the main pages. Third, we collected all the comments on all the posts mapped (N comments = 571,123, including comments and replies). Fourth, we identified the chains of interactions that were constituted by a comment plus their replies (N chains = 43,396). Fifth, we sampled the chains randomly (95% reliability, 5% sampling error). Our final sample was constituted by 381 chains (n comments = 2,510). For details on these steps, see the Supplementary File.²

The Interplay Among Different Reciprocities

We argued earlier that reciprocity has been thoroughly addressed by scholars in the literature. Typically, however, empirical studies focus on specific dimensions. Recent methodological advancements in this field have laid robust groundwork for observing these occurrences. They offer valuable methods that, when integrated, can significantly enhance our comprehension of online discussions.

² Link to the Supplementary File: https://osf.io/yvuad/?view_only=03895039b0dd433d9d9132a24ddb94fe

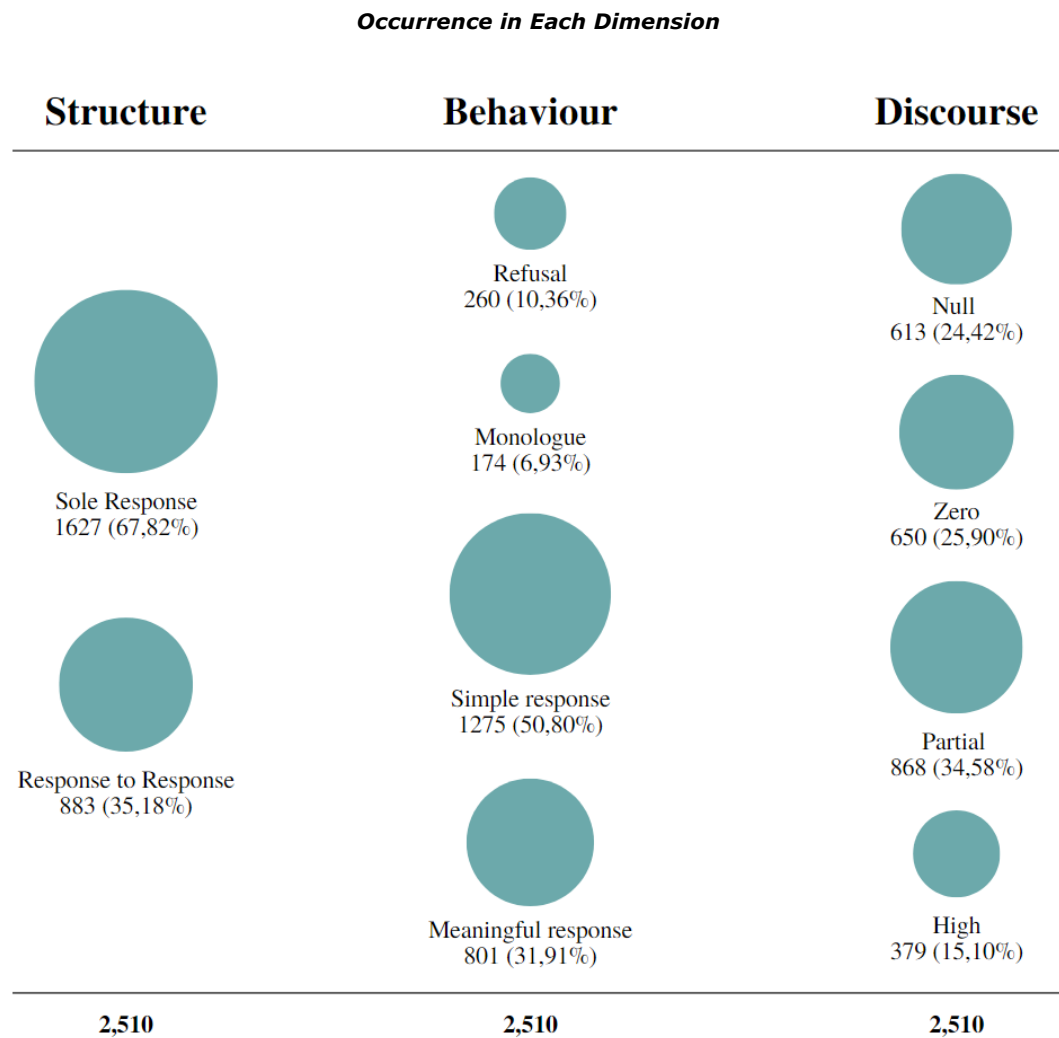


Figure 5. Degree of reciprocity in each dimension.

Our first research question inquired about the distribution of each dimension of reciprocity, namely, structure, behavior, and discourse. Figure 5 shows that in the *structural reciprocity dimension*, most entries were *sole responses* (67.82%). Yet, we observe that the rate of *responses to responses* (35.18%) is also significant, suggesting that users periodically continued to respond after being replied to. The *behavioral reciprocity dimension* is where reciprocity is most easily found, and the majority of exchanges constituted *simple responses* (50.80%). Interestingly, we found that explicit *refusals*—that is, when a user manifests openly they do not want to talk to another participant, either to listen, read, respond, or somehow engage in the conversation at stake—are infrequent but not discardable (10.36%). Concerning the *discursive dimension*, we found that half of the comments did not have any reference to the problem/actor expressed in previous comments, suggesting therefore, the absence of reciprocity across meaning (*null* + *zero* =

50.32%). Still, the other half of comments displayed references to substantive content previously expressed, at least partially (*partially* reciprocal + *highly* reciprocal = 49.68% of entries).

The overall observation offers us a rather gross picture, that is, only the distribution of each dimension in relation to the aggregate. To get a more detailed picture, our second question asked whether each dimension was explicitly linked to others. For this, we used correlation tests to examine three pairs: *Structure* × *behavior*, *structure* × *discourse*, and *discourse* × *behavior*.

Outcomes of Structure × Behavior

Let us, first, look at the relationship between *structures* and *behaviors*. Figure 6 shows that there is a significant association between these two dimensions. Considering the four degrees of reciprocity in behavior, we note that three of them (*refusals*, *simple responses*, and *meaningful responses*) varied in accordance with the conversation structure:

- As was expected, we found that *meaningful responses* were positively related to *responses to responses*. This connection indicates that direct back-and-forth contact among users goes together with more engaging behavior.
- Surprisingly, however, we found that *refusals* were also positively related to *responses to responses*. This connection indicates that direct back-and-forth contact among users also triggers disruptive behavior.
- *Simple responses*, on the other hand, were negatively associated with *responses to responses*. This connection indicates that direct back-and-forth contact among users decreases the chance of mild behavior.

If we look at these three associations together, we can interpret that continuing to respond leads to changes in user behavior: *Simple responses* are reduced, and more *meaningful responses* and *refusals* emerge—two parametrically oppositional behaviors. Thus, when users continue giving responses, replying to each other, forming bidirectional networks, their behavior leads to either more meaningful communication or to sudden ruptures in communication.

We found only one category—*monological* behavior—that did not vary in relation to the conversation structure. Monological behavior occurred in similar proportions in both *sole responses* and *responses to response* structures alike. This led us to assume that when users adopt a monological behavior, the conversational structure does not matter. Monological behavior characteristically involves speaking “to” an audience, but not “with” others, and hence addressing some interlocutor is not the speaker’s concern.

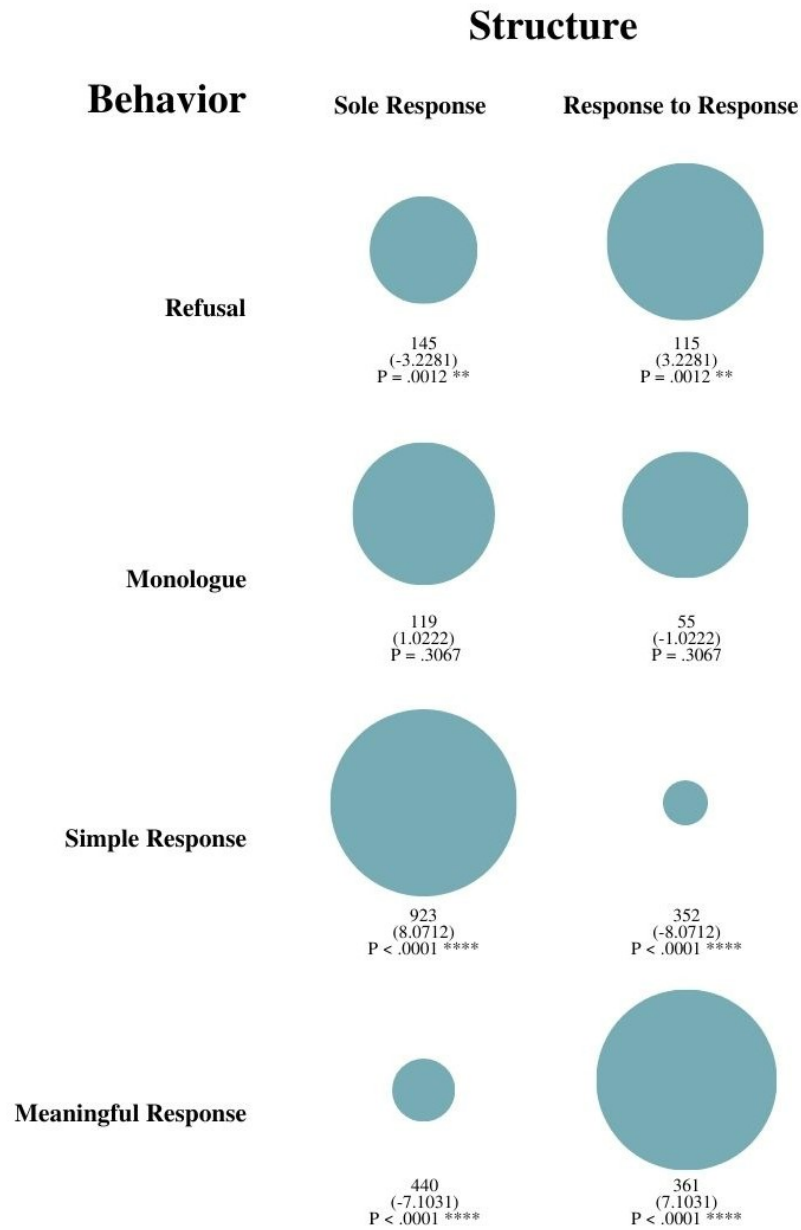


Figure 6. Correlation between the structure and the behavior dimensions.

$$\chi^2 = 76.7202.$$

$$p \text{ value} < .0001.$$

Note. Values in parentheses are residual scores.

Circle sizes are based on residual scores.

Outcomes of Structure × Discourse

Let us now consider the relationship between *structure* and *discourse*. Discourses are categorized into four degrees, ranging from less reciprocal to more reciprocal: *Null*, *zero*, *partially*, and *highly* reciprocal. We examined these sublevels' variation in relation to *structurally nonreciprocal (sole response)* and *structurally reciprocal (response to response)* entries. Figure 7 shows statistically significant results.

Considering the four degrees of reciprocity in discursive, we note that three of them (*null*, *zero*, or *partial*) varied in accordance with the conversation structure:

- As was expected, we found that *null* reciprocal discursive responses were negatively associated with *responses to responses*. The *null* case existed almost always in *sole responses*. This connection indicates that when users form bidirectional networks, it is very rare for them to not make at least one reference to frame the issue at stake.
- As also expected, we found that *partial* reciprocal discursive responses were positively associated with *responses to responses*. More reciprocal structure considerably increases reciprocity concerning the substantial content. When users have direct back-and-forth contact among themselves, they are also usually interested in addressing at least partially what others previously said.
- Interestingly, however, no statistically significant variation was observed in *high* discursive reciprocity in relation to structure. It is worth noting that the explicit full incorporation of others' substantive references in one's own statements either to corroborate, criticize, or reject is a rare practice—this category had the lowest overall occurrence in our study. Probably, other variables not linked to the structure needed to be observed to clarify other factors at play here.

To summarize, even if *high* discursive reciprocity does not change depending on the structure, a partial level of discursive reciprocity increases considerably when reciprocal structures are formed. For users to build a common discursive terrain (at least partially), the formation of reciprocal structures plays a central role. Structure and discourse are positively associated in this sense.

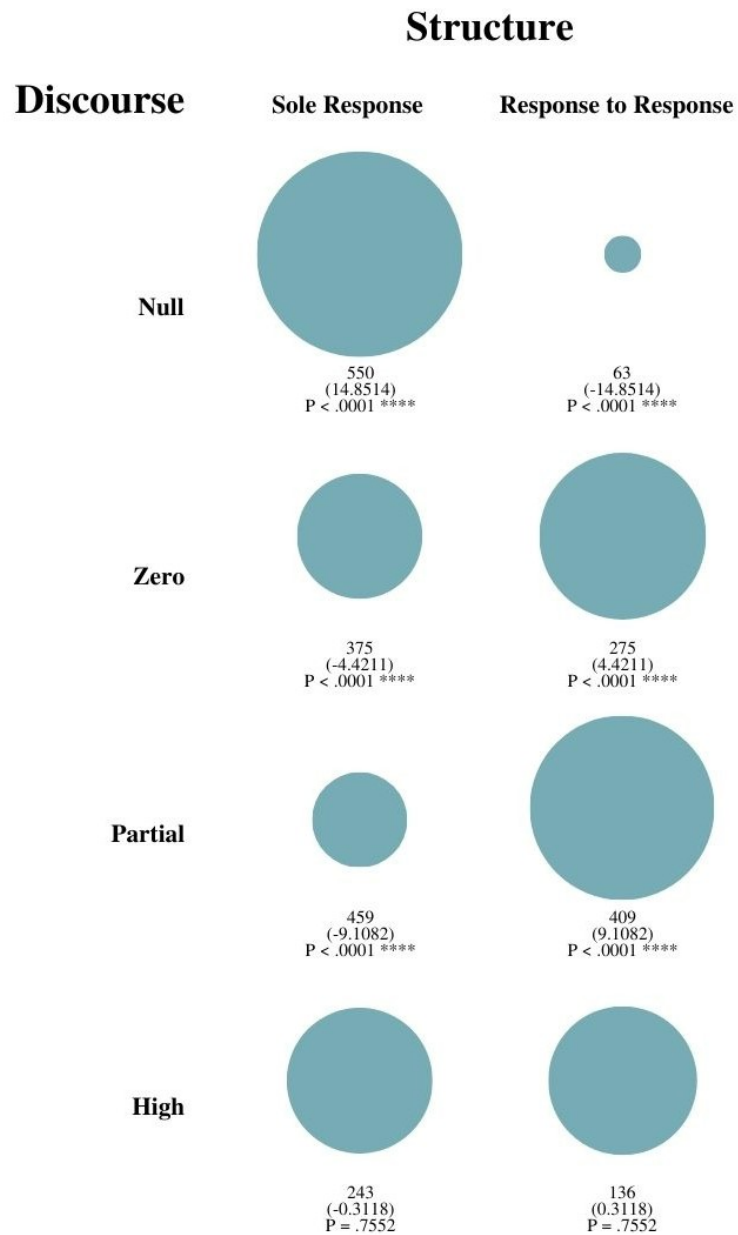


Figure 7. Correlation between the structure and the discourse dimensions.

$$\chi^2 = 235.5342$$

$$p \text{ value} < .0001$$

Note. Values in parentheses are residual scores.

Circle sizes are based on residual scores.

Outcomes of Discourse × Behaviour

Finally, we appreciate the relationship between *discourse* and *behavior*. Discourses are categorized into four degrees (*null*, *zero*, *partially*, and *highly* reciprocal), and behaviors are categorized into four degrees (*refusals*, *monologues*, *simple responses*, and *meaningful responses*). Different relationships were observed, and these are reported in Figure 8.

- As expected, we found that *refusals* were positively associated with *zero* discursively reciprocal responses. When users show disruptive behavior, they tend to ignore the content of previous arguments, claims, or how a given issue is framed. The performance (behavior) aligns with the substance of the discussion.
- As also expected, *meaningful responses* were positively associated with *discursively highly* and *partially reciprocal* comments. When users show great behavior, they tend to incorporate or address previously used definitions. Behavior toward mutual understanding also had discourses toward common ground.

Let us shift to the relationship that is not so direct and positive:

- The behavior *simple responses* obtained the lowest discursive reciprocity scores. It is interesting to compare it with other behaviors: Although, as we mentioned, *refusals* were positively associated with *zero* discursive reciprocity, both *refusals* and *monologues* had still more reciprocal discourses than *simple responses*. “Lukewarm” behavior is not enough for reciprocity to emerge in discourse—in fact, even a dialogue refusal behavior seems to have better results for discursive reciprocity than simple answers. When users give simple answers, they usually do not frame the topic at all or completely ignore what was said previously. Simple answers do not promote discursive engagement; on the contrary, they promote a high presence of null or zero discursive reciprocity.

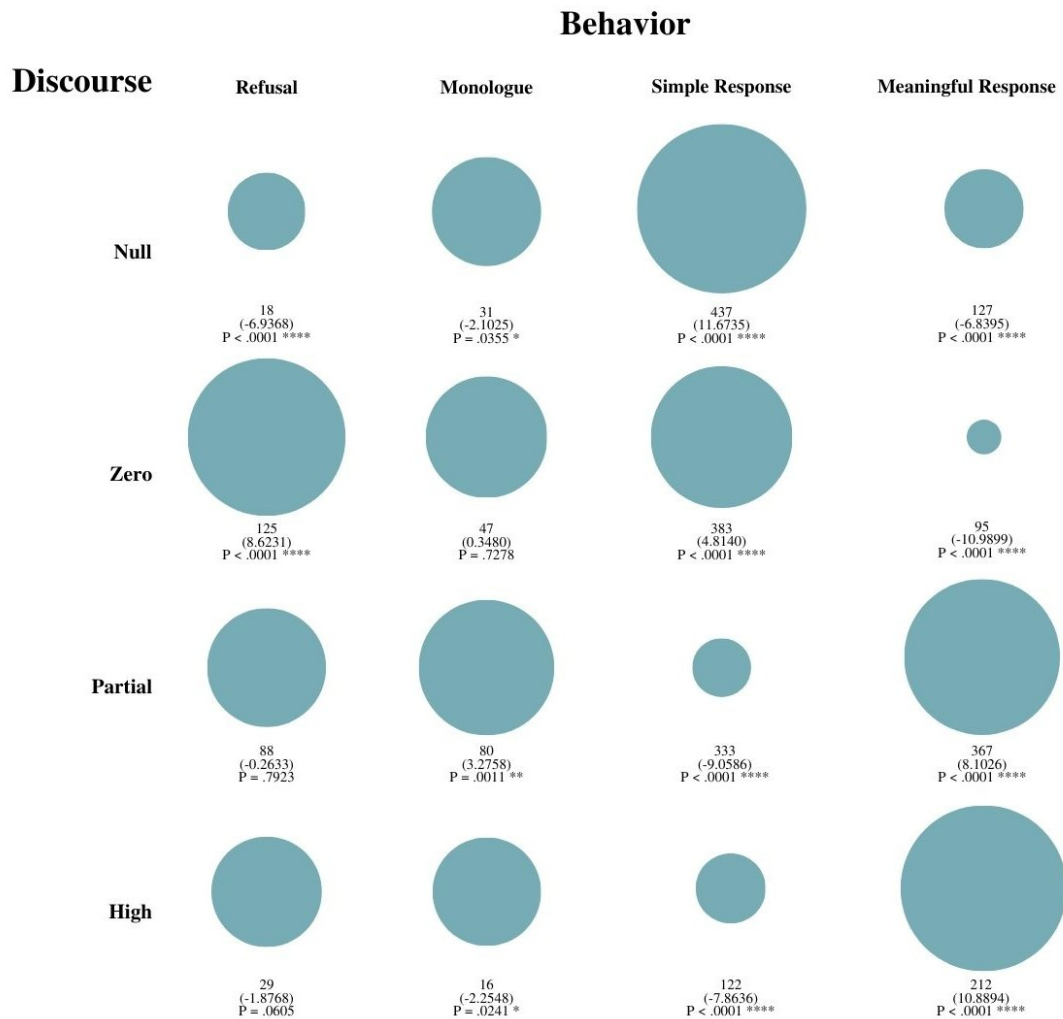


Figure 8. Correlation between the behavior and the discourse dimensions.

$$\chi^2 = 392.6286$$

$$p \text{ value} < .0001$$

Note. Values in parentheses are residual scores.

Circle sizes are based on residual scores.

Building an Integrated Approach

Given the long-standing interest in reciprocity in online communication, important efforts have been made to investigate its different levels in diverse and increasingly sophisticated ways. However, there is a gap in studies simultaneously measuring network structure, behavior, and discourse. In this section, we detail the implications of adopting an integrated analytical framework encompassing these three levels.

The complexity of reciprocity necessitates distinguishing among its three dimensions—structural, behavioral, and discursive. This distinction allows researchers to navigate theoretical complexities more thoroughly than conventional models based on one or, rarely, two dimensions. We should not assume that reciprocity at one level constitutes a highly reciprocal dialogue. By distinguishing among the three dimensions, our analysis reveals distinctive combinations, uncovering intriguing relationships.

First, our analysis uncovers a complex relationship between structural reciprocity and other dimensions. While the reciprocal structure was linked with both optimal behavior and optimal discursive mutual referentiality, it was also associated with disruptive behavior (refusals to dialogue). This finding aligns with previous research indicating that more interaction does not always mean better quality conversation (Esau et al., 2021). Increased interactions and networks of responses can perpetuate conflict and attacks (Saveski, Roy, & Roy, 2021). Continuing interaction opens the opportunity not only for mutual exchange but also for confrontation and display of toxic contents. Continuous interaction allows for both mutual exchange and intense disruptions.

Second, by distinguishing among the three dimensions, we also found that behavior has a complex relationship with discourse. Although optimal behavior was associated with optimal discursive engagement, moderate behavior was found to have the poorest discursive reciprocity. Surprisingly, even entries displaying *refusals* and *monologues* showed higher levels of discursive reciprocity than simple answers. This suggests that adopting a simple reciprocal behavior (characterized by neither speaking alone nor refusing to enter into a dialogue, yet not actively seeking to understand others) not only avoids disruption but also restricts deeper engagement across discourses, viewpoints, and conflicting claims. Disruptive behavior may enable more discursive engagement than a moderate one. Indeed, previous studies have shown that vigorous reason giving is associated with some level of disagreement (Black & Wiederhold, 2014; Laden, 2012; Maia, Hauber, Choucair, & Crepalde, 2021) and even some level of incivility and disrespect (Maia & Rezende, 2016; Rossini, 2022). In essence, discursive exchanges tend to be associated with either optimal or poor behavior rather than moderate behavior.

A complex analysis of each dimension fits into our model. Each dimension is important to grasp components of the dynamic of online conversation and assess intricate patterns. The challenge for scholars lies in combining these dimensions effectively. In our integrated approach, the measurement of each dimension involves different variables in line with developments in the field. Yet, the definition of a common unit of analysis and standardized parameters allows examining different combinations of dimensions. Thus, additional complexities derived from combinations of these dimensions can be handled with analytical rigor. Observing sequences of interactions within various reciprocity dimensions enriches our understanding of digital communication dynamics. Moving forward, embracing an integrated approach can bridge theoretical models of communicative exchange, providing a more holistic understanding of online interactions.

Final Considerations

This article explored various approaches to understanding and measuring reciprocity in digital environments, aiming to clarify implicit assumptions behind its measurement. Through a survey of theoretical and empirical studies, our work contributes to establishing a comprehensive analytical framework. A deeper

understanding of reciprocity, going beyond simple answering, including structural, behavioral, and substantive content in a simultaneous manner is crucial for constructive conversations—a basic requirement for democratic communicative exchange (Gutmann & Thompson, 1996; Habermas, 1996).

Recognizing the significance of all three dimensions, our integrated approach offers analytical implications for advancing research incrementally. It furnishes empirical researchers with evidence and interpretative insights to navigate the complexities arising from digital interactions. Future research might explore reciprocity in different contexts and platforms, analyzing its dimensions and reevaluating trade-offs. An analytical framework encompassing various reciprocity aspects seems more promising than singular approaches. Researchers are encouraged to experiment with diverse methods to foster innovative research in this domain.

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