

Public Opinion and New Communication Technologies: The Impacts of Big Data on Public Opinion Studies from the Pragmatism Perspective

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In this article, we investigate how research on public opinion is influenced by public opinion polls, insofar as they function as a means of inquiry into reality. With increasing datafication of the world, scientific and technological changes emerge and impact the field of public opinion studies. Today, we have traditional opinion polls on the one hand and polls made possible by the advent of Big Data on the other. Beyond being a mere handful of different methodological protocols, each of these models attributes a specific meaning to the expression “public opinion,” taking us back to the old epistemological clash between theory and methodology often observed in this field of study. We describe the main differences between the two models and then, from the perspective of Peirce’s pragmatism as a theory of meaning dependent on social communication, analyze the transition we are going through today, when social media dominates the digital sphere.

Keywords: public opinion poll, big data, meaning, pragmatism

The objective of this work is to investigate the issue of public opinion research in the current stage of the so-called “Big Data era,” in which the traditional public opinion poll model is faced with emerging methodologies for analyzing data collected from communication happening through platforms of social media. There is currently the coexistence of two main models for performing large-scale public opinion research, each structured on distinct epistemological principles—and, to some extent, contrasting: a traditional model, based on samples collected by means of surveys; and a new research model (developed mainly in the last decade¹), made possible by techniques for the collection of data from users of online social media on the Internet, such as Facebook and Twitter. In the Big Data era, databases and their processing logics have become the basic syntax of information and social communication, to the point of constituting a new cultural genre and supporting a new ideology called dataism (Van Dijck, 2014, p. 198).

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¹ Just for the sake of strict objectivity, from now on, we will call the first model the “traditional model” and the second the “new model.”

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Amid so many perceived differences between the traditional public opinion research model and the new model, one of them will be highlighted throughout this article. This concerns a distinction in the meaning of the concept of public opinion, that is, a distinction in what is understood by public opinion according to each model. As we shall see, each of the models has an epistemological basis that determines not only the methodologies applied but also the very understanding of the object "public opinion" that is being studied and that guides the production of the research. The choice of our theoretical framework (pragmatism), which will also serve as a tool for our analysis, was made precisely because of it. Peirce's pragmatism (Bergman, 2009) is deeply concerned with the definition and communication of concepts within particular groups (e.g., scientific communities), in addition to dealing with the possibility of these same concepts adapting to reality. With this in mind, we would like to make it clear that it is not our intention with this article to place the two models as competing possibilities. Instead, we intend here to show how each of them fits when we evaluate them through pragmatism as a criterion of meaning—which will be better explained in the section dedicated to Peirce's theory. In fact, both models can be simultaneously valuable, as seen in previous works (Bail et al., 2018; Brady, Wills, Jost, Tucker, & Van Bavel, 2017; Conover et al., 2011; Kim, Hsu, & Gil de Zúñiga, 2013).

There is no universally accepted definition of the term "public opinion." An ongoing difficulty in its definition is the possibility of multidisciplinary approaches among areas and subareas of knowledge that study the object "public opinion." Beyond the field of communication, these include at least philosophy, history, sociology, political science, social psychology, and statistics, among others, each of which has its own epistemological basis, theories, hypotheses, and methodologies. Modernity brought with it several thinkers who focused on the study of political philosophy and approached society's opinions and beliefs as topics of high relevance. Some noteworthy examples are Maquiavel, Hobbes, Locke, Montaigne, and Rousseau, the last being the precursor to the use of "public opinion" as a philosophical and political concept. In chapters such as the XVII, XIX and XXI of his *The Prince*, Machiavelli (1996) suggests to his recipient, Lorenzo de Medici, that he listen to the voice of the people and pay attention to their opinion, under penalty of incurring a bad reputation in the face of wrong attitudes or failed ventures. In Hobbes's (1992) words, "the strength of the powerful has no basis but in people's opinion and belief" (p. 23). According to Splichal (2012), philosophers such as Locke, Hume, and many others widely promoted Hobbes's "theorem of opinion" (p. 25). Finally, for Rousseau, there is a phenomenon that is based on social communication between private entities—without a necessary insertion or relationship with legislative or legal issues—which results in a social unit called public opinion. In his study of public opinion in the 18th century, Ozouf (1997) reinforces Rousseau's idea and points to an essential characterization of this concept held at that time: that of a court independent of all other democratic powers (p. 356).

A common feature of these modern approaches is the complex theoretical character attributed to the study of public opinion and the attempt to explain its functioning. This changed with the invention of public opinion polls and the adoption of a strictly empirical and quantifying view of the object in question. The term "public opinion" came to mean—or be understood as—the aggregation or sum of individual opinions, becoming synonymous, from a commonsense perspective, with the results of the research carried out to study it (Goidel, 2011, p. 11). This interpretation has been much criticized over the past century, being accused of simplifying public opinion by use of a shallow quantitative approach. With the arrival and consolidation of the Internet, Big Data, and, especially the rise of social media to the position of a digital

public sphere, there is renewed debate about public opinion as a theoretical object emergent from complex and conversational social relationships (Herbst, 2011). At the same time, there is rekindling of the discussion concerning the nature of public opinion. In his recent publication, Splichal (2022) develops a broad overview of the debate that resurfaces in the field of public opinion studies after the establishment of these new technologies. We quote an excerpt that sums up this idea well:

In the crisis of opinion polling, which followed the long-standing conceptual polarisation associated with it, data and opinion mining and analysing large data sets from social media offered an opportunity to reflect on old problems of conceptualising and researching public opinion while looking for new approaches to solving them. (Splichal, 2022, p. 6)

Bearing this in mind, we seek to answer the following question: From the perspective of Peirce's pragmatism (as a theory of meaning based on communication between members of a community of interpreters; De Waal, 2004), what is the difference between these two models of public opinion research, in terms of their capacities to act as means of inquiry about reality? To answer this question, we have divided this article into three parts. The first one will introduce Peirce's (1974a, 1974b, 1998) pragmatism, especially insofar as it helps understand the problems that surround the definitions of what public opinion is. In the following two parts, we will present the main differences between the models, which, it should be noted—as done before—are not exclusive, but complementary. We will do this by describing the context in which they arise, the expected objective using one model or the other, the main methodological protocols employed, and what is meant by public opinion in each case. In the last part, we will address these differences from the perspective of the principles of Peirce's (1974a, 1974b, 1998) pragmatism, which will be discussed below.

Peirce's Pragmatism and Communication

Pragmatism was introduced by Peirce in the 1870s not as philosophy properly, but as a doctrine about methods to clarify our ideas and produce enduring beliefs shared by community inquirers. In this regard, it is in blatant contrast with other strains of pragmatism that were introduced by other thinkers, such as William James (Fisch, 1986). For Peirce, the final opinion about any question of practical consequence, if it is to be considered scientifically valid, should be the result of a process of investigation by a method that takes into account the production of provisional hypotheses, the extraction of the consequences of such hypotheses, and then the test of those consequences against reality by a controlled process, which is called scientific (Chiasson, 2005). The ignition of this sequence must be a fact of experience that disturbs our mental habits or beliefs, introducing an irritation or doubt that would not give up its annoyance until the actual mental habit is broken and a new habit is introduced as a possible explanation for the fact.

If taken as a normative method to govern the relation between theory and practice, as well as continuous endeavor by a community—be it a scientific or a more general group, such as a society or even humanity—this process would be destined, in the long run, to eliminate false beliefs and produce knowledge that, although always fallible in principle (for reality is an unpredictable source of novel facts that are not explainable by the accepted opinions and theories), would have a lasting permanence, granting the

establishment of mental habits that would ground particular beliefs and social opinions. The above is explained in Peirce's seminal texts, such as *How to Make Our Ideas Clear* (Peirce, 1974b), and *The Fixation of Belief* (Peirce, 1974a), published in the late 1870s. In Peirce's (1974a, 1974b) original elaboration, pragmatism gives a criterion of meaning. Aliseda (2016) explains that "In Peirce's epistemology, thought is a dynamic process, essentially an interaction between two states of mind: doubt and belief" (p. 144). Although beliefs and habits give us the disposition to act in a certain way when the need arises, doubt leads us to act precisely so that we can end it. Peirce (1974a, 1974b) uses the term *inquiry* for the incessant search to achieve a state of belief, which can result in both true beliefs and false beliefs. In seeking to escape from the irritating state of doubt, in the direction of establishing a belief, we may naturally make mistakes resulting from beliefs that are not true. For this not to occur, we must fix a belief properly so that we do not fall back into a state of doubt in the future. Seeking to clarify this task, Peirce (1974a) describes four methods of fixing beliefs. The author does not indicate the first three (tenacity, authority, and a priori and scientific), each with its own mode, as being suitable for the lasting fixation of beliefs.

We begin the explanation of the scientific method with Peirce's (1974a) sentence that nicely summarizes the need we have for it: "To satisfy our doubts, therefore, it is necessary that a method should be found by which our beliefs may be determined by nothing human, but by some external permanency—by something upon which our thinking has no effect" (p. 242). As we can understand from Peirce's (1974a) words, the scientific method (or science itself) surpasses the other methods in that the decision about what should or should not be believed is independent of any number of particular opinions, being based solely on a reality that is not affected by what is thought of it. Although the understanding of this reality may not appear to be easily achievable, such reality becomes a practical postulate of reason, to the point where we must assume it and try to understand it (De Waal, 2004).

Furthermore, the fixation of beliefs based on the scientific method requires a consensus among individuals for them to be established in a lasting way. A community of individuals (scientists, for example, in the case of public opinion research) contributes to reaching a consensus, according to the scientific method of inquiry, which attests to the validity of the opinion or belief. However, one could question the actual possibilities of assessing reality and, consequently, obtaining a lasting validity of a given belief, even if by means of inquiry and supported by a consensus. In answering this question, we should note that Peirce (1974a) believed that through inquiry we can reach the true answers to the problems of reality. He even believed that we might already possess some of them; however, we cannot assert with certainty that this truth has been reached in a particular case.

In his mature years, after reevaluating his semiotic theory, Peirce would revise some points of his pragmatism² and, along with it, his pragmatic maxim (De Waal, 2004). The main change that he brought at that time may be found in the psychological character of the original maxim, which at that time was considered by him as something negative. For this reason, he tried to bring it to light in semiotics, to make logical that which was previously psychological. We can then see how the maxim formulated in this second

² At that moment, the author started to call pragmatism *pragmaticism*, so that his original elaborations would no longer be confused with others that third parties had created. After some time, Peirce would return to using the term pragmatism in referring to his own elaborations (De Waal, 2004).

moment was reworded: "The entire intellectual purport of any symbol consists in the total of all general modes of rational conduct which, conditionally upon all possible different circumstances and desires, would ensue upon the acceptance of the symbol" (Peirce, 1998, p. 346). In this phase, the maxim came to refer to the practical effects that would be conceived (note the conditional tense) by a community of interpreters, if all possible resources were exhausted.

Communication is then considered by Peirce both the core and essence of the method in the production of social opinions grounded by collective experiences and aimed at general purposes (Bergman, 2009; Colapietro, 2007). Through social communication, particular opinions passionately held by specific individuals lose their impetus and become more general and vague as they are accepted in the community, thus entering in the common sense and even becoming unconscious beliefs. The final opinion would be a mental habit that should not be disturbed by any surprising fact—a mental state that can be only normative and the result of a free and open relation with reality experienced by our senses.

The Traditional Public Opinion Research Model

Traditional public opinion polls, as we know them today, emerged in the United States in the 1930s, within the mold of American functionalism, which influenced the methodologies and theories applied to the study of public opinion according to this model. Until then, it was common to research or measure public opinion by means of the so-called straw polls (Goidel, 2011, p. 11), surveys without scientific value, with no statistical methodological foundations, mainly undertaken by media vehicles. In the American presidential election of 1936, however, George Gallup's polls had unprecedented success in predicting outcomes, marking the beginning of a new era in public opinion studies.

In the year following the election, a publication by Crossley (1937), a public opinion pollster, examined the potential limits of new opinion polls and the problems with the methods of inquiry used until then. Among the points discussed by Crossley in his text was the methodological difference between the two research models that existed at the time. One of them, the opinion polls created by Gallup, employed smaller samples, but had a statistical rigor that ensured the representative validity of the samples to be analyzed, while the straw polls were open to all who wanted to respond to them but were not representative. Crossley (1937) wrote about what was thought about this before the 1936 election:

Two other major differences of opinion existed. One side argued that the Literary Digest *could not be wrong because of its tremendous sample*, i.e., number of ballots. The other side argued that a relatively small sample could be used, if scientifically distributed. (p. 25; emphasis added)

It can be seen from Crossley's (1937) account that, at the time, not only was the use of a statistical basis in public opinion polls a novelty but also that there was no consensus or the need for it. However, after the success in the electoral context of 1936, and especially after the Second World War, the methodologies used by Gallup were raised to a level of extreme relevance in studies of public opinion (Splichal, 2012, p. 32).

With the establishment of scientific public opinion polls as tools for measuring and predicting public opinion, many perspectives changed in public opinion studies, especially epistemological ones. Reconciliation between theory and methodology became a central problem in public opinion studies, particularly in those of a theoretical nature. The posing of this new problem (how to reconcile the theories that seek to explain public opinion with the methodologies applied in the empirical study of it) led to epistemological debates between different schools of thought during the 20th century. In the 1950s, looking back to the first half of the century, authors such as Hyman (1957) pointed to the epistemological clash that had taken place, and that, in fact, persists to this day (pp. 55–57). These debates between different schools of thought sought to reconcile theories that explain public opinion with the methodologies applied in its empirical study. Notably, these debates involved various perspectives, such as behaviorism, which focused on observable behaviors and their relationships with stimuli; constructivism, emphasizing the role of individual cognitive processes in shaping public opinion; and critical theory, which aimed to uncover the underlying power structures and ideological influences affecting public opinion formation. Each of these schools of thought contributed to a richer understanding of public opinion and offered alternative approaches to studying this complex phenomenon.

In *Public Opinion*, Glynn, Herbst, Lindeman, and O’Keefe (2016) presented a categorization of possible definitions for the concept of public opinion, according to five main theoretical currents³ that have gained strength since the beginning of the last century. The categories are diverse, but the authors state that the first one, public opinion, is an aggregation of individual opinions and is undoubtedly the most widespread and adopted, whether by researchers or according to common sense. A determining factor for the consolidation of this view of public opinion and the propagation of the methodology applied in the traditional model is its scientific basis, made possible by statistical rigor in the collection of the data to be subsequently analyzed. According to Goidel (2011), it was only after public opinion began to be studied using the model inaugurated in Gallup’s opinion polls that this object acquired a genuine scientific construction (p. 18). It may be noted that the methodological premises initially used in the traditional research model (especially its statistical characteristics) have remained unchanged up to the present day.

In the traditional research model, the representation of the public opinion of a given population can be statistically extrapolated from the samples collected during surveys, assuming that the demographic features of the area in which this population is located are properly considered. According to Macreadie (2011),

Quantitative opinion polling refers to surveys that measure the opinion of a sample of people. These are particularly useful in election scenarios where answers are relatively straight-forward and are restricted to “yes/no” answers. Quantitative opinion polling often involves questionnaires, face-to-face interviews, telephone surveys and online/email surveys. (p. 6)

³ Namely: (1) Public opinion is an aggregation of individual opinions; (2) Public opinion is a reflection of most beliefs; (3) Public opinion is found in the clash of group interests; (4) Public opinion media and elite influence; (5) Public opinion is a fiction.

Given the statistical representativeness of traditional public opinion polls, their main function is to forecast future scenarios, especially in electoral contexts.

As stated above, some authors have severely criticized this research model in recent decades, especially concerning the meaning given to public opinion, which is understood as the aggregation or sum of individual opinions. In particular, two of these critics can be highlighted: Herbert Blumer and Pierre Bourdieu.

In the mid-20th century, amid the rising use of opinion polls, Blumer (1986) disagreed with the paradigm then in vogue, referring to the quantification of public opinion, and proposed a new approach that was essentially conversational and based on social interaction. According to Anstead and O'Loughlin (2015), Blumer based his critique of public opinion polls on three allegations: "The public is social, public opinion is hierarchical, and true public opinion requires that the public is engaged in political debates" (p. 214). Specifically concerning the traditional research model, Blumer (1986) made scathing criticisms of the theoretical foundation used by public opinion researchers and the improper application of research techniques, including questioning the scientific nature of public opinion polls. According to the author (Blumer, 1986, pp. 195–197), the traditional research model lacked an abstract and generic object, "public opinion," which should be isolated by researchers, to guide the production of research. Furthermore, the author considered that there was no effort made by researchers to produce generalizations or criteria that could characterize or distinguish public opinion, to explain it and advance its understanding. In the words of Blumer (1986): "Their [pollsters] work is largely merely making application of their technique. They are not concerned with independent analysis of the nature of the public opinion in order to judge whether the application of their technique fits that nature" (pp. 196–197).

In turn, Bourdieu (1984), in *Public Opinion Does Not Exist*, provides an epistemological critique of public opinion research according to the traditional model, disagreeing with the interpretation of public opinion as an aggregation or sum of individual opinions, opposing this essentially quantitative view. In his work, the sociologist follows a line of reasoning that seeks to unravel and refute some of the premises underlying the production of opinion polls. To this end, Bourdieu (1984) identifies three postulates that, in his words: "imply, it seems to me, a whole series of distortions that are observed *even when all the conditions of methodological rigor are obeyed* in the collection and analysis of data" (p. 222; emphasis added)⁴; that is, distortions in research that do not depend on the methodological protocols used by large institutions. These postulates are as follows: "Every opinion poll assumes that everyone can have an opinion; or, in other words, that the production of an opinion is within the reach of everyone"; "all opinions have equal value"; and "in the simple fact of asking everyone the same question, the implicit hypothesis is that there is a consensus regarding the problems, in other words, that there is agreement on the questions that should be asked" (Bourdieu, 1984, p. 222).⁵

⁴ Original: "impliquent, me semble-t-il, toute une série de distorsions qui s'observent lors même que toutes les conditions de la rigueur méthodologique sont remplies dans la recollection et l'analyse des données" (Bourdieu, 1984, p. 222).

⁵ Original: "Toute enquête d'opinion suppose que tout le monde peut avoir une opinion; ou, autrement dit, que la production d'une opinion est à la portée de tous"; "toutes les opinions se valent"; "dans le simple fait

Like Blumer (1986), Bourdieu (1984) argued that the equity of value between the opinions of individuals (one of the principles of the polls) was misleading, however undemocratic it may sound. On the contrary, the authors see no problem in asserting that certain citizens have greater influence, compared with others, consequently impacting public opinion. In short, both authors understand that there are certain problems with public opinion polls of an epistemological nature that must be addressed before researchers go into the field. For both authors, as well as for the critical currents that led from them, public opinion is more complex than the representation obtained by successful opinion polls. According to them, this object would be constituted in the social shock arising from the interactions among the interests of different groups and individuals.

The New Model of Public Opinion Research

The problem of reconciling theory and methodology in public opinion studies has not only persisted to this day but it has also been rekindled by what Couldry and Hepp (2016) call the "wave of digitalization," (p. 34) characterized by the advent of computers, the Internet, and, most recently, social media. With intense developments of materials and technology in society, the dynamics of the public sphere are altered, acquiring a digital aspect. Consequently, public opinion starts to originate and propagate in this new environment, especially in its most refined format: digital social networking sites. Under the ideology of what Van Dijck (2014) calls dataism (p. 198; the belief in the power of data and the institutions that own it), in a context where objects from the most diverse areas of science, such as computing, physics, mathematics, political science, bioinformatics, and sociology, among others, have been affected by the growing use of Big Data (boyd & Crawford, 2012, p. 663), the opinions of individuals do not escape the unstoppable movement of datafication, whereby the world is turned into quantifiable data suitable for predictive analysis (Mayer-Schönberger & Cukier, 2013).

There are different interpretations for the term Big Data, originating from different areas of knowledge (Demchenko, 2014, p. 105). Using common sense, we can adopt the definition according to which "the label 'big data' is used to describe a set of practices involving the collection, processing, and analysis of large data sets" (Schäfer & Van Es, 2017, p. 15). However, given that certain characteristics stand out and strongly affect the way of approaching the study of public opinion, we will also give our interpretation. Beyond large quantities of data, we understand that three aspects characterize Big Data, namely velocity, exhaustivity, and the possibility of using nonparametric statistical models.

According to Kitchin and McArdle (2016), velocity and exhaustivity are the characteristics that, among many others, ontologically distinguish Big Data. The first, velocity, concerns the possibility of uninterrupted (continuous) collection of data constituting the research samples; in traditional social science methodologies, sample collection is performed occasionally, in some cases with long times between collections. The second characteristic, exhaustivity, concerns the possibility of collecting and analyzing the entire universe of a given population ($n = all$), in contrast to the traditional model, where limitations are

de poser la même question à tout le monde se trouve impliquée l'hypothèse qu'il ya un consensus sur les problèmes, autrement dit qu'il y a un accord sur les questions qui méritent d'être posées" (Bourdieu, 1984, p. 222).

imposed by time and cost, so the samples are statistically extrapolated to represent the entirety of a universe. Added to the interpretation of Kitchin and McArdle (2016), the third aspect that we believe defines Big Data is the possibility of using nonparametric statistical models. In considering the transformations that Big Data bring to scientific processes, Pietsch (2013) highlights that the traditional parametric analyses, performed using hierarchical vertical models, give way to horizontal models that dispense with the use of laws and general a priori rules to identify correlations within the analyzed data. The analyses of social media using the new public opinion research model, employing horizontal approaches where data are collected and parameterization occurs only a posteriori, allows the analysis parameters to be continuously constituted by the intensive use of algorithms applied to the data.

Therefore, in parallel to traditional public opinion research methods, today we have those that use the new methodological options, which can focus on the study of both individual opinions and public opinion in general—studies such as those by Neethu and Rajasree (2013) and O'Connor, Balasubramanian, Routledge, and Smith (2010) show us that it has been at least a decade since such methodologies began to be used. Employing Big Data, the difference of the new model lies in the use of specific methods and techniques for data collection and analysis that are profoundly different from the questionnaires and interviews typically employed by traditional research institutes. Instead, in this new model, data collection and analysis are performed by monitoring social media such as Facebook and Twitter.

Survey and polling methodology [. . .] gives numerous tools and techniques to accomplish representative public opinion measurement. With the dramatic rise of text-based social media, millions of people broadcast their thoughts and opinions on a great variety of topics. . . . Mining public opinion from freely available text content could be a faster and less expensive alternative to traditional polls. (O'Connor et al., 2010, p. 122)

Here, text posts from social media users are collected and then analyzed as actual opinions of these users. However, because of the lack of demographic representativeness of social media users, this model does not necessarily have the purposes of individually analyzing opinions or predicting future scenarios, but mainly seeks to monitor the public debate conducted on the Internet or to represent the aggregate opinion of the population (of users) concerning a particular issue or topic (O'Connor et al., 2010, p. 125).

In this model, surveys are no longer used, since the field researcher and traditional techniques are replaced by digital platforms and by techniques that enable the collection of data from these platforms. By adopting digital technologies, different possibilities for studying public opinion are opened: from analysis of news websites, including their contents and interaction between readers (Kostygina et al., 2020), to issues related to the use of memes (images) and influencers to leverage digital marketing campaigns (Eun-Ju, Jang, & Chung, 2021). One of the most commonly adopted methodologies is semantic analysis, which is often accompanied by sentiment analysis. For example, Gaumont, Panahi, and Chavalarias (2018) carried out an extensive sociosemantic analysis of how social communication on Twitter developed during the French presidential election of 2017. In this study—based on the theoretical-methodological premise that retweets are a better measure than follows or mentions—more than 60 million exchanges were used among 2.4 million users of the network. The authors place their research as follows among genre studies:

Giving access to an intermediate level, between sociological surveys in the field and large statistical studies (such as those conducted by national or international organizations) we demonstrate that social networks data make it possible to qualify and quantify the activity of political communities in a multi-polar political environment; as well as their temporal evolution and reconfiguration, their structure, their alliance strategies and their semantic particularities during a presidential campaign through the analysis of their digital traces.
(p. 2)

By incorporating Peirce's (1974b) pragmatic perspective, we can better understand how the semantic content of tweets and the influence of key users played a crucial role in shaping public opinion and political discourse during the election campaign:

1. The importance of context in shaping meanings and interpretations: Peirce's (1974a, 1974b) pragmatism emphasizes the role of context in determining the meaning of signs and symbols. This understanding can help researchers analyze how the context of social media platforms influences the interpretation of messages and the formation of public opinion;
2. The dynamic nature of public opinion: Pragmatism recognizes that meanings and beliefs are not fixed, but evolve through a process of continuous interaction and interpretation. This perspective can help researchers account for the fluidity and changeability of public opinion in response to new information, events, and communication channels;
3. The role of influential actors in shaping discourse: Peirce's (1974a, 1974b) pragmatism acknowledges the importance of individual actors in contributing to the collective process of meaning-making. By examining the influence of key users on social media platforms, researchers can better understand how certain individuals can shape public opinion and political discourse through their messages and actions;
4. The interplay between individual expressions and collective opinion formation: Pragmatism highlights the connections between individual beliefs and the larger social context. This understanding can help researchers investigate how individual expressions on social media platforms contribute to the overall formation of public opinion and the emergence of shared meanings and beliefs.

In terms of graphical visualization, in the traditional model the visualization of data is usually achieved using simple tables, charts, and graphs, whereas in the new model, it can be performed by means of more complex graphs—coming, for example, from graph theory. In this case, the nodes (representing the users of social media, whether individuals or organizations) relate to each other through edges, resulting in the construction of large networks with thousands or millions of nodes. The way that these relationships are structured can indicate different types of connections, depending on their directions and intensities. This is especially important, because it creates the possibility of analyzing public opinion based on the *relationships* among different actors (citizens, politicians, journalistic vehicles, government institutions, private corporations, etc.). The result of this is a representation (on a large scale) of public opinion that no longer focuses on the aggregation or sum of individual opinions but on which societal groups interact with each other (and in what way), in the face of certain problems or topics of interest. It is possible to determine the main actors (individuals or organizations) in the digital public sphere, which groups have more

supporters, and to what extent they relate, in addition to making it possible to visualize the movement of formation and propagation of public opinion in networks during a particular period of time.

Given all of this, it can be seen that, not only have the methods and techniques used in the study of public opinion been expanded, but the very understanding of what public opinion is has also been affected. Herbst (2011) understands that with the arrival of the Internet and social media, the epistemological clash between theoretical and empirical perspectives of public opinion has been updated. According to the author, there is a subterranean struggle in this field of study, consisting of two opposing approaches that can be found at any time, one being quantifying and the other being conversational. In her words: "Public opinion as an aggregation of individual opinions and public opinion as a nonquantified but powerful conversation" (Herbst, 2011, p. 88). What we here call the traditional model is included in the quantifying approach, whereas the new model belongs to the conversational approach. By that, we mean that despite both being based on quantitative analyses, the result of the new model allows us to contemplate an image of public opinion that is essentially relational (i.e., it is based on communication between groups and individuals). Finally, the author recognizes that with the use of the new technologies, we can identify and study public opinion traits evoked by authors critical of the traditional model, such as Blumer, which cannot be fully grasped by means of opinion polls (Herbst, 2011, p. 96). Revisiting his critique of the traditional model: Blumer (1986) argued that the traditional model was insufficient for capturing the complex and dynamic nature of public opinion. He emphasized that public opinion is a collective process, shaped by interaction, communication, and negotiation among groups, rather than a mere aggregation of individual opinions. By applying new technologies such as social media analysis and computational methods, researchers are now able to study public opinion in a way that addresses Blumer's concerns. These approaches allow for the examination of public opinion as an ongoing, interactive process, capturing the nuances and complexities that opinion polls could not fully grasp.

Pragmatic Analysis on the Transition Between Models

In this section, we will tie together what has been said about each research model from Peirce's (1974a, 1974b, 1998) pragmatism view, which was visited earlier. We will make a theoretical analysis of the emergence of new digital methodological possibilities to study public opinion and, more specifically, how each model supports scientific communities to better understand the object of public opinion as a phenomenon of social reality.

We believe it is necessary to start by defending the idea that both research models discussed here constitute scientific investigations and that, as a consequence, they are inserted in the scientific belief fixation method. According to Peirce (1974a), reality exists regardless of what we think or believe about it, and the scientific method must necessarily try to fix our opinion or belief about reality, according to reality itself. In turn, public opinion as an object investigated using the scientific method must itself be a real object, independent of the research and methodologies to be used to study it. We understand, therefore, that public opinion is a phenomenon that is found in reality (whether that public opinion is referred to by philosophers of modernity or that which is made possible by new contemporary digital technologies), and whatever the reality of this object, it already existed before Gallup's method of scientific research or social media monitoring. As much as the phenomenon "public opinion" may be dialectically affected by the

production and publication of research, its reality is something that has been noted for centuries. Accordingly, if the production of public opinion polls ceased or had never existed, this would not (or would hardly) change that public opinion is a phenomenon present in reality, constituting an extremely complex phenomenon (observe the centuries of intense debate about its nature and functioning).

However, what was understood by “public opinion” was abruptly changed with the invention of scientific research. In practice, we do not see public opinion as a complex and real phenomenon, born and developing within the public sphere, effectively impacted by this invention. The use that is made of public opinion as the sum or aggregation of individual opinions is, without a doubt, different from what was used before the polls, whether for predicting elections or for decision making by politicians or corporations. Therefore, for the use of public opinion, the changes brought about by opinion polls were, in fact, profound. However, these changes did not profoundly impact the nature of public opinion itself; neither did they enable a more complex understanding of the object of public opinion as a phenomenon of reality. Despite significantly impacting the use that is made of public opinion, Gallup’s invention did not have the same degree of impact in obtaining a belief about the nature of public opinion based on the reality of the object. It could be argued that the traditional research model somehow brings a deeper understanding of the object of “public opinion.” In this regard, we agree with the criticisms made by Blumer (1986) and Bourdieu (1984) of the traditional research model, according to which public opinion is more complex than the mere sum or aggregation of individual opinions, resulting from the clash of interests and the relationships among different social actors (individuals and groups). Or we agree with the view of Herbst (2011) that “true” public opinion is a complex conversational phenomenon, which, for that reason, is hardly quantifiable.

Essentially, the meaning of the concept of public opinion changes with the emergence of each research model. In investigating the two models (the traditional and the new), it can be seen that in addition to a set of methodological procedures, each of them understands public opinion according to an epistemological basis, which, in turn, is the result of a defined paradigm. From a pragmatic point of view, this is absolutely relevant, as, ultimately, what each research model understands by public opinion—that is, the meaning given to the object “public opinion”—fundamentally affects what one seeks to understand about it. Consequently, the meaning of this object is associated with the practical effects of adopting one model or another.

The scientific method used to inquire about the reality of what public opinion is, namely public opinion research itself, should, according to Peirce’s (1974a) pragmatism, align our beliefs about the phenomenon with what the phenomenon actually is. In this sense, taking the positions of Blumer (1986), Bourdieu (1984), and Herbst (2011), the model that would best help us to define a meaning for the object “public opinion” is the new model. In this, although quantifiable, the meaning of “public opinion” is found in the relationships among different actors in society, and not in the individual opinion of each one that makes up the public sphere. Therefore, by highlighting the complexity of the conversational aspect of the phenomenon, the new model understands by public opinion something closer to what is seen in the reality of the digital public sphere. The practical consequences (referring to the pragmatic maxim) of adopting this meaning are more consistent with what is seen in reality, compared with the practical consequences of adopting the meaning given to public opinion in the traditional model, where public opinion is understood as the sum or aggregation of individual opinions.

For Peirce (1998), reality is something that would be represented virtually (and truly) by the opinion of an ideal community of researchers who had all the necessary time and resources at their disposal. Bringing this to our context, we have the following understanding: Public opinion is a phenomenon of reality that is sought to be apprehended; in an ideal situation, public opinion researchers, given the possibility of infinite time and resources, would finally encounter true public opinion, that is, public opinion as it is in reality. Peirce (1998) said that yes, we could already possess this final and true opinion about our object of study, but that unfortunately, we could never be sure about this. Thus, the methodologies available to us today may not be sufficient to grasp the phenomenon of public opinion in its deepest complexity. Evidently, some methodologies may provide public opinion results that are more complex, compared with the use of other methods, albeit with certain problems, such as demographic representativeness. Therefore, using the models available to us today, it is the task of public opinion researchers to seek, following the consensual scientific method, with its inherent possibility of failure and constant revision, an understanding of the phenomenon of public opinion that associates the meaning of this object to the complexity of what is present in reality.

In practical terms, the traditional model and the new model of public opinion research are complementary rather than competing. There are instances where both models have been employed together to provide a more comprehensive understanding of public opinion dynamics. For example, Conover and colleagues (2011) combined the traditional model of analyzing aggregate individual opinions with the new model of examining sociosemantic dynamics in their study of political polarization on Twitter during the 2010 U.S. midterm elections. Similarly, Bail and colleagues (2018) investigated the role of social media in political polarization by merging individual opinion measurement through surveys with the examination of sociosemantic network dynamics on social media platforms. Kim and colleagues (2013) also explored the impact of social media use on civic engagement by incorporating both individual opinion analysis and the investigation of communication processes within social media networks. These cases demonstrate the potential benefits of integrating both models of public opinion research to gain a more holistic understanding of public opinion and its influences on various aspects of society.

In addition, the pragmatic analysis of the transition between models of public opinion research underscores the need for a more interdisciplinary approach to the study of public opinion. As communication technologies continue to evolve and influence the formation of public opinion, it is essential for researchers in the field to engage with both theoretical and empirical inquiries to better understand the complexities of public opinion in the digital age. This article's synthesis of Peirce's pragmatism and contemporary public opinion research aims to contribute to this understanding and inspire further investigation into the intertwined nature of public opinion, communication, and technology.

Final Considerations

With the arrival of the wave of digitalization, technologies such as the Internet, social media, and, more recently, Big Data, have come to the fore. The social and material transformations brought about by such technologies have consolidated a facet of the public sphere that is essentially digital, which has profoundly affected the study of public opinion. Not only have new methodologies for analyzing and measuring public opinion emerged but also the understanding and meaning of the object have changed.

When the traditional model emerged, the earlier theoretical and complex philosophical understanding of public opinion was smothered by a quantitative view, with public opinion being understood as the sum or aggregation of individual opinions. Now, the rise of the new model opens space for the return of a conversational view of public opinion. From the viewpoint of Peirce's pragmatism, these changes are highly relevant, since public opinion research provides a way for us to inquire about the reality of public opinion itself. After centuries of theoretical debate about the nature of this phenomenon, we now have empirical research methods and techniques available that allow for an understanding (albeit embryonic) of public opinion based on complex interactions among social actors. We will end this article by reaffirming that we do not see the two public opinion research models discussed here as being mutually exclusive. On the contrary, we believe that collaborative work involving researchers of both approaches, combined with theoretically grounded explanations about the object "public opinion," can lead to a deeper and historically supported understanding of this object.

By examining the transition between the traditional and the new model of public opinion through the lens of Peirce's pragmatism, this article bridges the gap between theoretical and methodological debates in public opinion research. The interconnected analysis of the previous sections highlights how the pragmatic critique of public opinion research and the role of technology in shaping public opinion complement each other. This interconnectedness helps to establish the contribution of this article to the existing literature.

Finally, the communication focus of this article was to explore how the pragmatic readings of the technological change in public opinion research relate to existing critical work on public opinion. By interconnecting Peirce's pragmatism with the study of the new model of public opinion and its communicational aspects, this article aimed to provide a fresh perspective on the relationship between technology, public opinion, and its conceptualization. This approach contributes to the ongoing debate on these themes and their role in shaping contemporary political and public discourse.

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