



The Transparency Game: Government Information, Access, and Actionability

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Abstract

Democratic governments might be required by law to disseminate information to the people. This is called governmental transparency. What is the burden of transparency? We propose a “pragmatic information theory of communication” that places information accessibility as a foundation of transparency. Using a game model—the Transparency Game—we show that the pragmatic theory is the only one that makes it difficult for governments to appear transparent (transparency *de vidi*) while not actually being transparent (transparency *de facto*). There are two important consequences of understanding transparency through the theory: (1) Accessible information must be *actionable*, and (2) cognitive science plays a vital role in assessing the accessibility of information. These consequences can have implications for public policies that promote transparency.

Keywords Governmental information flows · Governmental transparency · Information access · Information actionability · Pragmatic information theory

1 Introduction

Every government releases information to communicate with the people. Other public organizations, such as financial institutions or public corporations, may also have a government-mandate to release information to customers or shareholders. People need

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this communication to function in a democratic society. This exchange of information between government (or organization) and citizen is called *transparency*. Sometimes information is released as required by law; other times at the government's discretion. Sometimes information is released to satisfy a legitimate government function; other times, it is released as a propaganda or spin. Sometimes, information is released in the form of statements or documents and other times as spreadsheets and databases. People receive this information with varying amounts of attention, interest, skill, and understanding, often at a cost.

When communicating or releasing information, it not only matters what is said but also how it is said. Parents select *what* to talk to children about, but they also select how to talk to them so they understand (or do not understand, if discussing mature topics in their presence). In mandated communication, how a message is communicated matters. For example, what has been termed “legalese” (as well as font size and length of text) hampers customer's ability to understand a user agreement, often by design. In limited cases, such as the U.S. Credit CARD Act (Credit Card 2009), regulating financial statement disclosure or as the International Conference on Harmonization Guidelines for Good Clinical Practice (ICH GCP), setting requirements for medical informed consent, some regulatory steps have been taken to address the format, clarity, and availability of the communicated information. But, by and large, considerations of format have been ignored in regulations (both about transparency specifically and other issues in general).¹

To discover how transparent the information flows are, it is necessary to break down the process into its component parts: (1) understanding the communication mechanism, (2) understanding the format of the information, (3) understanding the actors involved and their possible motivations, and (4) understanding the legal constraints and motivations in the communication process, including any potential ulterior motives.

In this article, we make the following arguments: First, to understand the concept of transparency, especially government transparency, we need to examine not only what information is released (the content of the information) but also how it is released and how accessible it is (the format of the information). Because the question of format has received less conceptual scrutiny, and because it has more general structure (*vis-a-vis* the content, which constantly varies), we focus our attention on format, that is on the problem of accessibility.

Thus, second, to provide a correct account of accessibility, we need to have a better theory of the basic act of communication between two agents. We call this new theory of communication “the pragmatic information theory of communication”. This is the most important contribution of the article.

Third, to argue for the theory, we develop a new methodological tool—the transparency game. We make a distinction between transparency *de facto* and transparency *de vidi* (in appearance). We claim that a correct theory of communication and, thus, a

¹ Ignored, that is, as an opportunity to improve transparency. Considering the large recent literature on regulatory capture (see Dal Bó, 2006 for a review), showing that in many places, the texts of regulations (and their judicial review) are carefully crafted by special interest groups whose aim is often misaligned with the purpose of the regulation, we can expect that the format of the information is purposefully obfuscated. Note that regulations, qua texts, are forms of government communication, and as such subject to transparency analysis.

correct account of accessibility, is such that a sender of information (e.g., a government) cannot cheat by appearing to be transparent while not being so.

Finally, we validate our analysis by applying it to the US Social Security system, looking at how the format of information released by the Social Security Administration may be better understood. The particular choice of example is less important than the methodology for analysis we offer. The theory may be useful in a number of cases where release of information by a government (or other) institutions is required.

The article is organized as follows: In section 2, “Transparency,” we offer an analysis of the concept of transparency by separating the problem of sufficiency of information and the problem of accessibility of information. Section 3, “The Problem of Inadequate Access,” makes the distinction between transparency *de jure*, *de facto*, and *de vidi* and thus set up the central theoretical problem that drives the rest of the analysis—what concept of information access allows transparency *de facto* and transparency *de vidi* to coincide? In section 4, “The Transparency Game,” we define a three-player game—involving a sender, a receiver, and a transparency monitor—and explain how the game can be used to identify the appropriate theory of communication that solves the problem of inadequate access. Section 5, “Communication Theory in the Transparency Game,” examines two important classes of communication theories—the Shannon and Grice theories—and using the transparency game, it identifies their weaknesses. In Section 6, “Pragmatic Information and the Transparency Game,” we offer our own pragmatic information theory of communication, whose central idea is *actionability* of information, and show how (within limits) it passes the test of the transparency game and thus provides a richer account of information access.

After completing the analytical and theoretical parts, the paper we apply our analysis in section 7 “The Analysis in Practice: The Case of the US Social Security System”. There we examine, with the help of our pragmatic information theory, how information from the social security administration is disseminated. We identify some weaknesses and positive developments and make a few recommendations about how transparency of the system may be improved. Due to the complexity of real-world problems related to transparency, our discussion of the case study is necessary superficial. It is offered mainly as a proof of concept for the applicability of the theoretical ideas developed in the article. Finally, in the concluding section, we summarize our achievements in light of the parts identified above and suggest future directions for research.

2 Transparency

Transparency, qua government transparency, can be analyzed in different ways: as a moral problem, as political and institutional design problem, and as a conceptual-semantic problem. The conceptual-semantic is the most basic, in the sense that it is presupposed by and constrains the other accounts. Here, we focus on the conceptual-semantic problem.

At the most basic level, transparency is a problem of communication between two agents. Communication science has developed sophisticated theories of communication with varying scopes and targeted toward various social organizations. To provide the greatest generalizability and to keep assumptions to a minimum, we assume the most basic act of communication as a transmission of formatted information as a message

from a sender to a receiver.² Theories of this type of information flow, going back to Shannon (1948), have a long history and have been deeply analyzed and tested. Our discussion advances beyond Shannon's theory by focusing on semantic information (and pragmatic information) (Floridi 2013). This evolution is, of course, natural because human communication is always being interpreted (in the context of goal-directed actions).

Transparency is a relational property, even though it is sometimes treated as an attribute. A government is transparent, then, in relation to another agent. The same actions of a government may make it transparent to one group of people and not transparent to another. With this assumption we distinguish between three different questions: (1) What ought a government do to be transparent?³ (2) What is the intention of transparency—how should/could the government act if it “wants” (or does not want) to be transparent? And, (3) how should the government act to *appear* transparent? Both the government and citizens as agents can be evaluated in relation to these questions, but the government agent will be the focus of this project.

We define transparency as follows:

An agent (or an institution) **I** is *transparent* to another agent (or public) **P** if it makes *sufficient information* about its operation *accessible* to **P**.

Transparency, according to the definition, must meet two conditions: (1) the information made available must be *sufficient*, and (2) the information must be released in a way that is *accessible*. The two conditions track different dimensions of the “transparency” communication act.

The sufficiency condition is related to the *content* of the information—what information must be released. When there is a transparency debate about whether a PAC must release information about its donors,⁴ we are having a debate about the content of the information that must be released. Sufficiency is another relational property, it depends on a goal. Information is not sufficient by itself. It is sufficient when it contributes to an agent's ability to engage in a goal-directed action. The goal is determined by the agent who needs the information. Alternatively, the goal may be determined by principles within the applicable theory of democracy and specific laws about what information must be released. Most discussions about transparency, especially when balancing opposing drives such as security, revolve around sufficiency.

The accessibility condition is related to whether the information gets to its destination and whether the content is preserved.⁵ If the debate is about whether a PAC should release donor names vs. donor ID code-names, then this would be about accessibility.

² In communication research, at least as early as the work of researchers such as Berlo (1960), Schramm (1954), and others, it has been recognized that communication is a continual process. Theories based on single, one-direction acts cannot capture the full complexity and subtleties of the social dynamics of communication. We are fully aware of this. However, our goal is to offer a conceptual analysis of transparency. To this end, it pays to minimize complexity of the models that the theories describe.

³ There is an important complexity here. In some cases, a separate agent may be responsible for making the government transparent. One role of the media may be exactly this. We will return to this question later.

⁴ US Federal Election Committee Statute §102 <<https://www.fec.gov/regulations/102-1/2018-annual-102#102-1>> See Section 9 about “Accounting for contributions and expenditures” (52 U.S.C. 30,102(c))

⁵ In some communication theories, this is referred to as the channel (McLuhan). Of course, the notion of “channel” is used in different ways in different theories (Berlo 1960). As a result, we regard the notion of channel as a variable fixed by the specific communication theory.

Accessibility can be orthogonal to sufficiency. Assume that a government agent needs to release some information (a memo, a report or some data) in order to meet the sufficiency condition. The agent can adopt different strategies for releasing that information: The agent creates the memo (in printed form) and either (1) buries it under 10 ft of ice under the North Pole (and makes this public), (2) translates the memo into Latin, or (3) writes the memo in highly technical legal language. All of these acts affect the accessibility of the information, in more or less extreme ways, and differently to different people. For example, to an illiterate person the very act of *writing* the memos may render them inaccessible.

Although sufficiency and accessibility are theoretically orthogonal, in practice they are often entangled. As we shall see below, the format of the information constrains what inference an agent can make from given information, (which is considerably less than information that is logically contained in any given content). When deciding what the sufficient information to be released by an institution is in order for it to be transparent, it is normal to assume that the audience can make some important inferences. If, however, the audience cannot make the inferences, the information may need to be divided into separate pieces. In effect, this is a reevaluation of original judgment of what information is sufficient.

Accessibility has a more general scope than sufficiency. While the content of the information varies, whether the format of the information is accessible depends on the general information-processing capacities of the agents. Naturally, information-processing capacities may vary from agent to agent (some agents may have a larger vocabulary, for example) or from topic to topic (names of donors vs. climate science statistics). Still, they vary in systematic and understandable ways that can be studied by cognitive science.

It should be clear that accessibility is essential for the act of communication, yet subtle in its character. This makes evaluation of transparency, and any normative consequences of the evaluation, difficult. This difficulty has consequences for real-life government transparency outside of any discussion about what information *should* be released. The tension arises from the possibility that the government will release information and, while it may *appear* to be engaging in an act of communication, in fact, it may not be engaging because of a failure of accessibility.

3 The Problem of Inadequate Access

To understand information access, it is helpful to start from when, intuitively, access fails. What happens if information *access* is not appropriate for transparency? Transparency is regulated by laws (or social practices) dictating what information must be released. This is transparency *de jure*. Such laws (or practices) are justified because democratic theory leads to a belief that some information (about government) must be made available to the public to interact with that government or improve their lives.⁶ A government can also be transparent *de facto*, if, in fact, the sufficient information (as dictated by the law) is made available. Normally, determination of transparency *de facto* is difficult to measure because, as we will argue below, is it difficult to measure when an

⁶ We are assuming that transparency is not justified by providing information for knowledge sake, as might be the case in an academic exercise.

agent has actually received the needed information. Instead, one looks at the communication mechanisms and practices used by the government. This is when conditions for information access, as conditions for the information channel, become important. A government may be regarded as (or appear) transparent when it is determined that the two conditions of transparency—sufficiency and accessibility—are met. We call this transparency *de vidi*. If we use the wrong conceptualization of information access, it is possible to have a separation between transparency *de vidi* and transparency *de facto*. In other words, a government may appear transparent and to follow the law, but not be transparent in practice. We call this the *problem of inadequate access*.

The ability of an account of information access to avoid the separation between transparency *de vidi* and transparency *de facto* can be used as a *theoretical test* for its appropriateness for an analysis of transparency. This is because the gap between transparency *de vidi* and transparency *de facto* is the result of an incorrect determination (according to the criteria provided by the specific account of access) that the agent has (in principle⁷) received the information. We can think of the account of access as a kind of “algorithm” for deciding when, in a given case, an institution is being transparent (assuming we have agreed about sufficiency). The output of the “algorithm” is transparency *de vidi*. We want to pick the algorithm whose output best matches that *de facto* the information has been received by the audience. The distinction between transparency *de vidi* and transparency *de facto*, thus, is only used as a test for a proposed account of information access, which makes up one part of the analysis of transparency. The distinction is interesting more broadly, especially in the case of social institutions that are subject of oversight, as it is with the problem of government transparency. However, as far as our argument is concerned, the distinction plays only this central, but limited function.

4 The Transparency Game

The problem of inadequate access is a more general problem of communication. For an agent to have access to information from another agent, there must be a proper channel through which the information can be transmitted. (Shannon 1948) To have an account of information access is, thus, to have a theory of the conditions required for establishing a channel through which the receiving agent can receive the needed information after the sending agent has made it available. In the motivating example, the sending agent is the government and the receiving agent is the public.

What theory of communication can resolve the inadequate access problem? Providing such a theory (which may not be unique) would result, we claim, in an adequate conception of transparency, as far as the adequacy component is concerned. We can approach the problem by examining a model we call the *transparency game*.⁸

⁷ To remind, we are interested in whether the agents can receive such an information in stuffily general case, given their specific architecture and background. In specific cases, an agent may not receive the information because, for example, he or her is not paying attention. We do not want to include such extraneous circumstances.

⁸ The transparency game argument we offer may be formulated without using the game analogy. The game we examine offers, in our view, a good pedagogical device to present the argument. Moreover, the structure of the game resembles actual institutional structure that may be used to enforce transparency. Thus, the formulation may facilitate translation into policy analysis.

The *transparency game* has three players: a sender (the government), a receiver (the people⁹) and a transparency monitor. The sender engages in a “communication” act. This could be a speech, a law, a release of a document, or creation of a database, among others—as wide a class of communication acts as possible. It is important to not be limited to only discursive information, but numerical data and visual information as well. The receiver engages in a “reception” act.¹⁰ Both the “communication” and “reception” acts must be identifiable. However, there is no assumption of successful information transfer. The transparency monitor observes the acts and makes a judgment about whether communication has taken place—whether the information was made accessible—and issues a finding.¹¹

The goals of each player are as follows: the goal of the transparency monitor is to detect correctly when a communication channel has been established. The goal of the receiver agent is to make sure sufficient information is received to be able to act on a further goal for which information is needed. (We assume that achieving the “further goal” is the reason transparency is important and that this goal is clear to all participants). The goal of the sending agent is to act in a way that the receiving agent does not, in fact, receive the needed information, yet the transparency monitor judges (incorrectly) that the information is accessible. In other words, the sender wants to appear transparent (*de vidi*) while not being transparent (*de facto*). Note that, in the transparency game, the goal of the sender is different from the goal of the communication (which is set by the laws governing transparency). For the game, we assume that the criteria the monitor uses to judge transparency are known to the sender. The sender cannot control the actions of the receiver, except through the choice of the channel through which the information is released (Fig. 1).

In this set up we can reformulate the research question about information access as follows: Can the transparency monitor select criteria for information access such that the sender does not have a winning strategy?

Below we will examine two foundational groups of communication theories, and will argue that, if the transparency agent uses them in the game, the sending agent will have a winning strategy. We will further propose a new way to approach this problem called the *pragmatic information theory of communication* that does not allow for such a strategy or makes such a strategy more difficult to accomplish.

⁹ There are many complexities and controversies with treating the “people” or the “public” as an agent. For the purposes of our discussion, we think of the “people” as a collection of individuals with their own goals. Thus, the communication act is really many simultaneous acts of individual people. There are clearly cases where political groups really do act as individual agents. Moreover, with the growth of social media, where micro-groups can form spontaneously and political communication can be transformed in real time—messages are decorated with comments and likes, and sources are entangled (the message is for X as shared by Y)—new communication dynamics have emerged. All of these complexities must be subject to further research.

¹⁰ Here, an “act” is simply a move in the game in response to another agent. The simplest such act may be to decide between ignoring or attending to the information. Reception of information is a highly active affair, as communication science has long affirmed and as cognitive science has demonstrated. This point will be very important once we develop a communications theory.

¹¹ Here, we are assuming that only accessibility is at stake. In a more general scenario, sufficiency must be established as well.

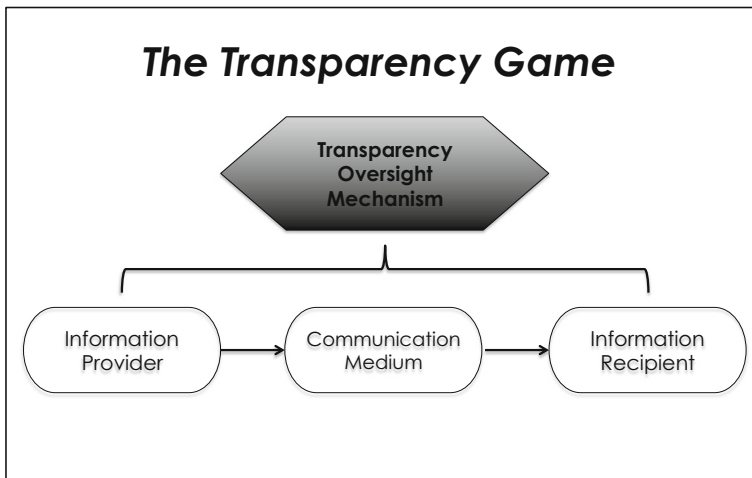


Fig. 1 The transparency game

5 Communication Theories in the Transparency Game

In the field of communication science, the concept of “communication theory” (or sometime called “communication model”) encompasses both theories of how communication is transmitted between two agents and theories of how information is propagated (gets created, filtered and transformed) in social organizations. Because we are interested in the conceptual analyses of information access, we focus only on theories that are formally precise and that focus on the basic links of communication. Theories describing two-agent models contain the building blocks of both social organization and communications flow theories and thus are more fundamental.¹² We focus on theories that target single acts of communication. As a result, we do not consider theories that emphasize feedback and iterated communication acts, where communication is optimized in the process. We do not assume that the parties of communication share common goals, such as to communicate more effectively. Just the opposite, the default scenario from the transparency game is one where the communicator wants to *not* communicate effectively.

The first is the classic theory of Claude Shannon (1948). Many extensions of the Shannon theory fall under the analysis, such as the traditional Sender, Message, Channel, Receiver (SMCR) Theory of Communication (Berlo 1960), or those of Schramm (1954) and Dance (1967). However, these theories contain dimensions that,

¹² It is completely obvious to us that the communication processes of a complex society, especially a democracy, are very complex, involving many players with divergent goals and differing social functions. Still, all communication, even broadcasting, is at the bottom a network of single communication links. This does not preclude the possibility that, in some cases, individual communication links depend on their place in the wider communication network. It is well recognized, for example, that official diplomatic statements are often intended for different audiences simultaneously (e.g., foreign and domestic); thus, a competent recipient of the information must understand this.

while very important for general analysis of individual and mass communication, are not as important for this task.¹³

The second is a generalization of Paul Grice's theory of communication, which has been discussed more in philosophy and linguistics than in communication theory. The theory places stronger demands on the audience to be able to infer the speaker's communicative intentions and, by extension, allows the speaker to anticipate and exploit (cooperatively) the audience's inferences when constructing the message.

We selected these two theories not with the intention of surveying the entire relevant literature, but because they are formally precise, well understood, and allow us to isolate the important condition that makes the pragmatic information theory we offer different—the ability to act on the information that is received. We call this the condition of *actionability*. In effect, we start with the simplest general theory of communication that is at the core of most other theories (Shannon's theory) and move to increase the role of the comprehension mechanisms of the receiver agent (Grice's theory). Identifying the failures of the two theories, we can focus in on the missing ingredient for a successful (with some caveats) test of information access.

5.1 The Shannon Theory

A Shannon theory views the goal of communication as a faithful reproduction of a message generated by a source (a system) in a receiver (another system). The message gets communicated by converting it into a form that can be shared between the sender and receiver. In other words, a message s_m is generated by the source (with some probability that this message will be selected). It is transformed into a form c_m that is encoded through some communication medium. Then, the message (as encoded in the form c_m) is then decoded in the form r_m by the receiver (with some probability).¹⁴

How can the Shannon theory be used by a transparency monitor actor in the transparency game? The monitor must identify the three variables of the theory and determine if appropriate reproducibility of the message exists between the source and the receiver(s). The source is what the information is about. It is the system whose character must be revealed to the public. This could be the government or something else that the government is responsible for having information about. The communication medium is whatever channel the government (qua sender) must select to communicate with the information recipients. It is the object with which the public will interact to get the information. In the context of the game, the action of the government is to format the message in an information medium.¹⁵

Using the Shannon Theory, the task of the transparency monitor boils down to assessing whether the message has successfully navigated the channel to the receiver.

¹³ For example, such theories recognize that human communication is dynamic and involves continual feedback between the agents or recognize that many agents (and institutions) with diverse goals participate in the communication process.

¹⁴ In the theory, the idea of a "message" is very general. Message simply means a difference in the system with respect to some available alternatives. Moreover, one of the most important components of Shannon's theory—noise—is not included in the discussion. This is because the theory runs into difficulty even when there is no noise.

¹⁵ The receiver medium is not identical with the receiver role in the game. The receiver of the game is an agent. The receiver in the communication theory is just a system whose state carries information about the source.

Applying the transparency game, the sending agent—the government—has the responsibility to assure that the translation of the message from the source to the medium is correct and complete. It also selects a form of the medium that can be correctly and completely converted to the medium of the receiver. In other words, the transparency monitor observes if the correct transition from s_m to c_m to r_m takes place.

The receiving agent will have access to information if the agent can distinguish between the possible messages. A verbal report of what is perceived by the receiver would be a sufficient test to determine that the information is received. For example, imagine the government must inform the people about how much money has been spent on government contractors and how that money has been used in the proposed projects. The government can report the data in a spreadsheet. Let us assume that every citizen can view the spreadsheet on a computer screen. The citizen can then identify the data on the screen. If asked, she can read the numbers accurately. The transparency monitor must conclude that the government has acted transparently.

Let us assume that the purpose for releasing such information is to enable people to decide if the government has managed its finances well and thus deserves to remain in political control. That is, in the game, the receiving agent, based on the information received, must act by voting in the next election for or against the government. Should we assume that the people, by default, would be able to vote according to what the information has dictated? We take it to be quite obvious they will not. Most (or many) people, *de facto*, would not be able to make sense of the data on the spreadsheet sufficiently well for the given purpose—voting. Clearly, various solutions to this problem are available, but this is beside the point. The point is that, according to the Shannon theory, the transparency monitor would not require such solutions in order to label the government transparent.

The more general point is that the receiver's ability to report the state of the medium is different from the goal-directed act for which the receiver needs the information. This allows the sender to have a winning strategy. The information is formatted in such a way that the receiver can report that it has been communicated, but, we argue, would not be able to connect it effectively to action.

5.2 Gricean Theory

Paul Grice (1991, (1957)) has suggested a richer theory of communication (or meaning transfer) than communication theory that relies on the content of the messages or background knowledge. Grice's theory is a response to traditional semantic theories of language that assume the meaning of an utterance (a message) is entirely determined by the syntactic structure of the utterance. The theory is based on the idea that the goal of communication is the transfer of the speaker's intention to the audience. The communication process, according to Grice, depends both on contextual conditions and on shared communication maxims that allow the receiver to infer additional meaning from the utterance. Examples of maxims include "Be truthful!", "Be Informative!," "Do not give more information than necessary", "Be relevant!", etc. A major part of Grice's theory involves identifying the existing maxims in human communication. Obvious violations of the maxims allow the listener to infer different meaning from the sentence. For example, if Sarah asks Alice, "How was the lecture?" and Alice

responds, “He spoke English,” Alice is being uninformative. She violates a conversational maxim. Sarah may infer that the Alice did not like the lecture.

There is a problem of scope in the traditional Gricean theory for the types of issues we want to address. The theory is designed to examine natural language. However, it is not clear what conversational maxims apply to, for example, publishing a database of financial information.

Fortunately, it is possible to address this problem by formulating a theory that applies to a broader class of informational media. Effectively, communication according to the theory has the following general form. A sender selects a *message* s_m (“The lecture was bad”) and formats it for transition c_m (“He spoke English”). A receiver gets the message and converts it in its preferred format r_m (however, “He speaks English” is represented in the mind). Then, using facts about the context of the message and general rules about how the message was generated (such as whether there are violations of conversational maxims, in the case “not being informative”), the receiver infers an alternate message i_m —*inferred message*—that hopefully, is closer in content to the original intended message s_m (that the lecture was bad). The sender is assumed to be aware of the process. Thus, the sender is responsible to assure that the message i_m is inferable from c_m . This places general constraints on communication that go beyond the source’s reproducibility and the receiver’s ability to discriminate.

Applying the conditions of the Gricean theory to the transparency game, there may be requirements placed on the format of the inferred message. Consider again the example of a contractor expenditure database. People must be able to understand the information as being about contractor expenditure. Moreover, they may be able to understand the information in the context of a typical contractor expenditure for a government of a given size. Thus, they may make judgments such as “the spending is unreasonably high” or “the government is very efficient in using its resources.” They may answer general questions about the source of the information and understand the content of the information.

The concept of “understanding” is too vague to be useful. The Gricean theory assumes that the transformation from the transmitted message to the inferred message follows general rules and context conditions. Such may include basic facts about how humans represent states of affairs, but the theory is not (what we may describe as) *deeply cognitive*. It is not sensitive to subtle characteristics to how different human beings comprehend or are affected by the formatting of the message. At best, the theory allows the replacement of reports such as “Column 55 labeled ‘capital expenditure for project’ at row 130 labeled ‘Happy Roofers Inc.’ reads \$15,000” with a report such as “The government has selected a company that was too small for the job.”¹⁶ In other words, the theory allows the receivers the ability to translate the information in a more understandable and relevant format.

In the context of the transparency game, the Gricean theory assumes that all the players are familiar with the general rules and contextual conditions of the communication. The transparency monitor can examine the transmitted message and, using reports from the receivers, can examine the inference of messages. It can evaluate the actions of the sender—generation of a transmitted message—according to how easy it is to obtain the inferred message, and how accurately the inferred message represents

¹⁶ Assuming, as a general rule, that a roof job should not demand \$15,000 of new capital expenditure.

the source. Information is more accessible to the receiver if the information can be inferred more easily and accurately from the transmitted message.

Will this conception of information access allow the monitor to see that the government is not truly being transparent? Can it prevent the government from having a winning strategy in some cases? The generalized Gricean conception of information access is certainly more robust than Shannon's. It places stronger constraints on the format of the transmitted information. The nature of the constraints depends, of course, on the general rules and context conditions. The harder the inference work demanded, the more important the optimization of the transmitted message and, thus, the more onerous the constraint. The Gricean theory, however, suffers from the same fundamental problem as the Shannon theory. The theory does not guarantee that receiver of the information will know how to use the information for the goals relevant for the game. This is because, ultimately, the account stops with the formulation of a representation of the source—the inferred message. Extra effort is required to convert the message into effective, goal-directed action. The extra effort is deeply cognitive, as we will argue in the next section, and outside of the scope of the theory.

This extra effort gives the government an opportunity for an effective winning strategy. Surely, for some easy problems, like deciding whether to buy a government bond based on its interest rate, the link between the information content of the message and action is relatively straightforward. Also surely, for some very hard problems where no clear link between information and action exist, one cannot expect a citizen to be able to use the information effectively, for nobody could. The interesting cases are those where a link can be found by experts, but the link is elusive for ordinary people.

For example, imagine a government that has an ideologically driven motivation to privatize the social security pension system. Assume that experts agree social security might enter a period of deficit 20–30 years in the future, based on predictable demographic and economic trends. But, the fund will then recover after 30 years. Could a government agency affected by such ideological interests, choose to format reports of the projections in different ways, so that the 20- to 30-year projections are easier to translate than the 30- to 40-year projections? Due to cognitive biases—such as salience biases, negative effect biases, etc.—people may systematically exaggerate the relevance of a short-term negative balance and, thus, support privatization. (We can also conceive of the opposite scenario where vested interests may choose to exaggerate positive projections).¹⁷

Here we consider the effects of cognitive biases as a feature of deep cognition, and thus not in the scope of available considerations for a Gricean transparency monitor.¹⁸ In this case, the government may trick the people into not using the same information effectively while appearing to provide accessible information. The result is that, in

¹⁷ Note how in this paragraph we used a parenthetical remark to formally appear neutral. Yet, we manage to hint that the right-wing position is deleterious. A reader will likely be left with the impression that we are making a political statement. And of course, we mean to (to illustrate the point). However, if somebody objects to our own ideological bias, we can use the remark as evidence for neutrality. Whether or not such evidence can be accepted depends on whether one takes deep cognitive considerations seriously.

¹⁸ This phenomenon is related to what is sometimes described as *framing* the information. Some cases of framing are quite transparent and can easily be included in a Gricean account. In fact, one of the motivations of Grice's theory was to show how careful formulation of an utterance might be used to change the meaning of the expression by highlighting contextual features. While his theory aimed to explain successful communication, it can be used to account for some instances of unsuccessful communication and deceit.

some cases, by being able to exploit how information is converted into action, the sender of the information may format the transmitted message in a way that will escape the assessment of a Gricean transparency monitor.

According to our analysis, therefore, the generalized Gricean theory of communication, while better than the Shannon theory, is still inadequate for properly defining information access. The failure of the theory is quite informative and suggests a solution. This we turn to next.

6 A Pragmatic Account of Information Access and The Transparency Game

The problem with both the Shannon and Gricean theories of communication is that in the way they provide an account of information access, the information transmitted need not be *actionable*. Therefore, we refer to our account of information access as pragmatic. In some cases, information may not be actionable because it is irrelevant for the task at hand. More interesting, information, vis-a-vis a particularly formatted message, may not be actionable because the receiving agent is not able to translate the message into an effective (or correct) goal-directed action. Such relevant, but non-actionable, information can be a result of the agent having no control over the circumstances of the message. But, it could also be the result of the format. More specifically, the format is inappropriate for whatever mechanism in the agent is responsible for acting toward a goal.

We imagine the following very general cognitive model of an *information-using agent*: An agent has a goal, such as voting for the best candidate in the next election (or is operating in some domain, such as financial planning, where precise goals are not set yet, but criteria of relevance about the information exist). In the agent, there are decision-making mechanisms that are tasked with the controlling the agent behavior in the domain. There may be different such mechanisms, depending on what information is available, what background information the agent has, and what cognitive or the theoretical skills the agent has. The decision-making mechanisms need external information to work effectively; however, and this is the key, the information must be formatted in a correct way for the mechanisms to work. Metaphorically speaking, the information must be in the “lingua franca” of the mechanisms responsible for making the decisions in the domain.

The cognitive model can help make the idea of actionability more precise.

A piece of information is *actionable* if it is relevant for the specific domain, and if it is formatted in a way that it can be integrated into (be the *currency* of) the decision-making mechanisms of the specific domain.

From this definition it follows that whether a message is actionable depends on the specific goal only indirectly. The goal constrains what actions are relevant and thus, what mechanisms can control the actions. But, the goals do not determine what the mechanisms can do. The same messages may be actionable for some goals and not actionable for others, even if the information in the message (in the sense of Shannon) is relevant for both. This is because the different goals may belong to different domains, and demand

different decision-making mechanisms. Continuing the social security example, some government-issued information about the state of the social security system may be actionable when the goal is “having a conversation about social security with co-workers” and it may not be actionable when the goal is deciding what policy to support.

One solution to the inadequate access problem is to make actionability a condition of information access. This is a principal idea at the foundation of the pragmatic information theory of access. Consider an analogy: When does one have money? Is it sufficient to have money if one has bank notes? Not by itself. Bank notes are money only if they can be used as exchange in a monetary economy. Some exchanges in the economy require money in a particular format. You cannot use bank notes for internet transactions. Such notes are not actionable for some goals (though, the economy may have ways of converting the format). Some vending machines are even more restricted. Two important points are relevant here: (1) the property of “having money” is not a property of the medium—the bank notes. Money requires a monetary system (and other normative practices, such as trust in the system). Money is the “currency” of the economy. (2) The format of the money may be actionable or non-actionable for different uses.

A pragmatic information theory of communication (abbreviated as pragmatic theory) has similar structure. It requires the existence of an information-using agent, what elsewhere is referred to an *information system* (see Vakarelov 2010), before the concept information itself can be defined. Information is the currency of the system. There are two central features of an information system: (1) We assume that information systems are goal-directed; in other words, an information system has a goal that it tries to achieve and information is needed to modulate the behavior of the system; and (2) we assume that humans are information systems¹⁹ According to the pragmatic theory, it does not make sense to talk about information outside the operation of the system.²⁰ We can talk about an information medium containing information, or information being communicated, but this must happen in relation to some actual or theoretical information system.

In a pragmatic theory, an agent (as an information system) does not have some information contained in some medium unless it is possible for the distinctions in the medium to become a currency in the system. Having a book in an unknown foreign language is like having foreign bills. The agent has no information in one case and no money in the other. Yet, a translation or exchange of either can make them accessible. Similarly, having a book in a lost language is like having a bill of expired currency—there is no possibility of either information or money. Thus, the format of the information is of central importance for the agent having it, or for the possibility of having it, if reformatting is possible.

The pragmatic information theory of communication allows us to formulate a pragmatic account of information access. An agent has access to some information, via some medium, if the information can be converted or integrated into the goal-directed mechanisms of the information system—it can become its currency. This is

¹⁹ This is a different thesis from what is sometimes described as the computational theory of cognition. For more discussion about the relation between cognitive systems and information systems as used here, see Vakarelov (2011).

²⁰ We recognize that “information” is plural notion, and there may be many domains where use of the term information can be appropriate. Computer science is an example. However, for the particular domain of investigation related to government transparency and information access, the players are cognitive beings and the stakes are related to human aims.

exactly the condition of actionability defined above. Thus, this account of information access implies that information must be actionable to be information for the agent at all.

One central feature of the pragmatic theory is that it makes information agent-dependent. Better yet, it makes information cognition-dependent, as it does not look at the agent as a single unit, but considers the internal mechanism driving goal-directed behavior of the agent. Communication theories, such as the Shannon's or the Grice's, stop only at the relation between the message and its source (where, in the Gricean theory, the message gets transformed in more complex ways). The pragmatic theory considers in addition what happens to the message inside the agent—its full *life-cycle*. Naturally then, the pragmatic theory places a stronger requirement on the relationship “Agent has information *I*” and thus, in some cases we might judge that the agent has not have disseminated the information, even if the agent “has” a delivered message.

What does this mean for the study of human communication? The assumption that humans are kinds of information systems requires the pragmatic theory to take cognition into account when analyzing human communication. In other words, to determine precisely whether an agent (or an agent type) has access to information, one must understand the workings of the cognitive system. In some cases, it is possible to obtain behavioral evidence that a person has information. In cases of everyday communication, we can be confident that one has access to much information. Since most communication channels are designed by humans, for humans, with clear feedback loops, they work quite reliably. Nonetheless, in some subtle or high-stake cases, like a government trying to push a hidden ideological agenda by manipulating the format of the information, understanding the workings of cognition is even more important.

So, how well does the pragmatic information-theoretic account of information access fare in the transparency game? The fact that judgments of information access by transparency monitors include the full life-cycle of the information in the game—from its release to its integration in goal-directed action—it is more difficult for the government to have a winning strategy. This is because there are no game-related parameters that the transparency monitor ignores; thus the government may not exploit its position as information disseminator. The difficulty is, however, that the conditions for successful information access under the pragmatic theory are quite onerous. They are, in fact, *epistemically incomplete*, in the sense that to determine, with precision, if arbitrary information is accessible, the transparency monitor must have complete understanding of human cognition. This is impossible in practice (for now). As a result, in practical scenarios with real governments and actual oversight players, epistemic inequality may be exploited. If the government (or a corporation) knows more cognitive science or has more resources to invest in using advance cognitive (and big-data) science to spin its message, the spin may go undetected.²¹

²¹ There is increased interest in cognitive science about the nature of cognitive biases and how formatting or framing information can have predictable effect on human behavior. These findings, when coupled with recent research in psychometrics—the study of how to measure and classify difference of human character traits and behavior—a big-data analytic techniques based on individual digital footprints—for example, the publicized study of predicting personality traits based on Facebook likes (see Kosinski et al. 2013)—can offer powerful tools for manipulation of opinion or affecting voter behaviors. It has been alleged that such tactics has been used in political companies, such as the 2016 Brexit referendum or the 2016 US presidential election. Such actionable tools for manipulation of information require high cost of entry, and thus can be available only to governments or large organizations.

Given the theory, its potential and its limits, we believe we can tell a compelling story about what factors are important in determining when people have actual actionable access to information. In fact, the pragmatic theory opens up the possibility of a more complex normative analysis of transparency. Information access and transparency are fundamental concepts of democracy. As a result, considerations of information access quickly get connected to considerations about rights and responsibilities. The more onerous the conditions for successful access, the stronger the responsibilities. For example, since the format of the information is important for information access, one may argue that providing access to information includes providing it in the most (practically) appropriate format. Since access also depends on the cognitive skills, background knowledge and education of people, such considerations must also be included in the access “equation.” We leave undetermined who has the responsibility to improve such factors to access. Some may be delegated to the government, some to the media and NGOs as transparency monitors, and some to individuals or groups of people. The important point is that such considerations become parts of the equation and thus subject to deliberation. Some e-governance initiatives, such as those in the EU, contain baby steps for implementing policies that are sensitive to such considerations.

7 The Analysis in Practice: The Case of The US Social Security System

The transparency game can illuminate the complexity of information access in specific policy areas. The game analysis does not solve transparency problems but opens up the information access process itself and identifies where the strengths and weaknesses of communication exchange might be. The most valuable policy applications are those that are less contested, because the focus is on the process and not on a complex question of whether access is desirable because it conflicts with other policy goals. “Democratic theory ought to prove itself useful in mundane policy contexts as well as elevated ones” (Vermeule 2007, p. 184). For instance, analysis of social security issues has broader social impact than finding out if a citizen is on the Transportation Security Administration’s “do not fly” lists. The expectation of the former is more transparency and the expectation of the latter is an exception to transparency. In other words, for social security issues, the citizen needs greater access to information and, for the TSA example, the issue is sufficiency, that is, the type of information that is being released.

US citizens and others who contribute to the social security system (referred to as recipients) expect to receive a social security benefit when they reach the required age. In general, if people have paid into the system, they will receive some type of benefit. A portion of the retired population expects to depend on social security for their post-career income. Thus, information about one’s specific prospects for a regular social security income and about the overall state of the social security system are important for retirement planning. This is because it is unclear how financially sustainable the social security system is. Because payments are based on a trust fund into which current workers pay to fund retirees, future sustainability is ambiguous as the number of those who draw on it increases relative to those who fund it and those who receive the benefits live longer. The U.S. Social Security Administration (SSA) acknowledged this tension in its 2014 Annual Report (<http://www.ssa.gov/oact/trsum/>).

Is the social security system transparent to the recipient? That is, is the information about a recipient's social security *sufficient* and *accessible*? The information people need (*sufficiency*) has (at least) two components: (1) how much a potential recipient has paid into the system and (2) how much a recipient can expect to get back upon retirement.

Recipients also need to get this information in a clear way to be able to plan for retirement (*accessibility*). Historically, accessibility, interpreted at this point as simply receiving the information, has been a bit rocky. Information technologies have made more information available, more ways of retrieving the information, and, at the same time, this information has been perceived as less secure. Social security is based on a national ID system through which each potential recipient is assigned a number. In the past, this number has been used for a variety of personal identification schemes from education to health and banking. This made the numbers valuable to those who wanted to use them for criminal activity. While the trend has moved away from using SS numbers as proxies for identification, they are still often associated with bank accounts and can be a security risk.

Given the landscape, how does a government let an individual recipient know about her/his status in the system? Inviting recipients to monitor their status online was logical, but presented early security issues, when, in 1999, the Social Security Administration's attempt to allow individuals to access their personal statements online was hacked (Stewart 2001). In 1995, the SSA began mailing statements to recipients who were close to retirement age. By 2001, and after the failed online venture, statements continued to be mailed to all recipients over 25. It was not until 2012 that the SSA was able to launch a new online portal that was secure enough for recipients to access their information. The concern about accessibility was aggravated by safety concerns, and it permitted the government to retreat on the information that it disseminated.

Sufficiency exists. Recipients can know how much they have paid into the system and how much they can expect to receive on retirement if nothing unusual happens. Basic access exists. Recipients can examine the information through the "green sheets" they are mailed each year with a summary of their information. They can create an account online and check their information at the SSA web site. *De vidi*, the government has done what it was supposed to do. It has released the information in two different, ostensibly accessible, forms. But, is this information actionable? Can recipients use this information to make the kinds of decisions the system is designed for them to be able to do? In order to answer these questions, while evaluating access, we may also need to revisit whether sufficiency was achieved, and we may realize that more content must be included.

At the most basic level, recipients use information about social security to plan their potential livable income after retirement. However, the information provided relies on certain assumptions. First, if the future payment outlook may not be sustainable, as described above, and that information is not figured into the generally accessible information, it is not actionable in a way that is useful. Simply put, recipients may be planning on income that either will not be available at all (in the worst case scenario) or not available at the level that they are expecting. So, while the information may appear accessible, it may not be actionable (thus it is not really accessible, according to our definition).

Second, there is a general assumption that the person receiving social security payments has been working their entire adult lives in the USA. There are caveats about wages earned in other countries and changes in legal status that can alter potential payments. But, these caveats are not communicated in the general summary information.

Third, there may be tax responsibilities on social security income. While this information is accessible if looked for, it is not included on the general summary statement.

The pragmatic information theory demands an analysis of the “players:” a sender, a receiver, and potentially, an oversight agent. The sender is the government through the Social Security Administration. This agency provides the information about social security to the receiver.

The receivers are the social security recipients, and the information they receive must be both comprehensible and actionable. While recipients may not be lumped into one large category, for social security payouts, the government (sender) often does this. Nearly 150 million people are eligible to receive social security benefits in the USA. But, they are not homogenous. Some have doctorates and others are not even secondary school graduates. Therefore, the assumption that the sender should distribute social security information in a uniform way must be wrong. According to the pragmatic theory, this thought can be taken to its next logical step: The information should come in a form that is relevant to the particular goals and can be integrated in the decision-making mechanisms of the recipient. For instance, if a 25-year-old and a 55-year-old both receive the prediction that their monthly social security income payout is \$2500 a month at retirement, will this information mean the same thing to each? Because the older person is closer to retirement, it may feel like a more meaningful prediction. While the younger may want more information about, for example, inflation rates or SS Trust Fund sustainability. This information may be available, but not easily accessible.

This situation provides options for the sender to think about alternative methods for information distribution—this includes both changes of the format of the information (accessibility) and adding more or clearer content (sufficiency). For example, there is a retirement calculator on the Social Security Administration web site. It is helpful, but may still be too simple for the information needs of some recipients. One strategy for overcoming this is moving from data provision to *resource provision*. The information itself is not the entire communication process. It includes the methods and the context in which the information might be inferred. A resource could be an interactive interface to the data that allows the users to include information about personal circumstances that can then be combined with the data to provide more actionable information. Rudimentary tools that can do this exist, but they are not very good and are difficult to use. This is because they are viewed as an added bonus to communication instead of a basic tool to assure transparency.

Who or what is the oversight actor in this case; the one who takes the responsibility for providing, ensuring the provision of, or facilitating the understanding of the actionable information? The oversight agent is not required by the communication theory, but the game scenario used to analyze information access suggests the need for a mechanism for controlling and optimizing access.

Up to a point, the Social Security Administration is taking on this role by law. It is releasing individualized information to recipients and aggregates information for an

annual report, which, among other things, describes the future viability of the fund. But, it does not connect the two. The media may play a role as oversight agent in this case. They focus on the fund’s future viability, but without the ability to connect its implications to individual futures. Another potential oversight actor is the American Association for the Advancement of Retired Persons (AARP). This is the largest interest group in the USA. It wields a lot of influence over policymakers who work with relevant programs, such as those dealing with social security and health care for the elderly (Fig. 2).

The analysis of the U.S. Social Security system based on the pragmatic theory of information access invites both bad and good news. The bad news is that the role of the oversight agent may not improve either the sufficiency or accessibility of information. Neither the law nor the media are able, for the most part, to make the substantive connections between existing information and potential information gaps in the accessibility of the information. The information may exist, but only the most tenacious and, possibly, educated recipients will be able to fill in those gaps.

The good news is that, in line with the structure of the transparency game, as outside evaluators, we can understand both the better and worse forms of communication. There are methods of communicating that will make more sense to some than others. There are methods and visualizations that will appeal more to some. The official U.S. Social Security Administration statement may be sufficient information in a small number of cases, such as those who are retiring very soon, before the predicted shortfalls, and those who have been working their entire adult lives in the USA. But, it is probably not sufficient information for others. Supplementary information seems to be available, and there may be ways for recipients to ask for help or clarification.

More good news is that this could also help the government agencies that are required to release the information. They could look at the process and adjust both the type of information that is released as well as the method used to release it. This

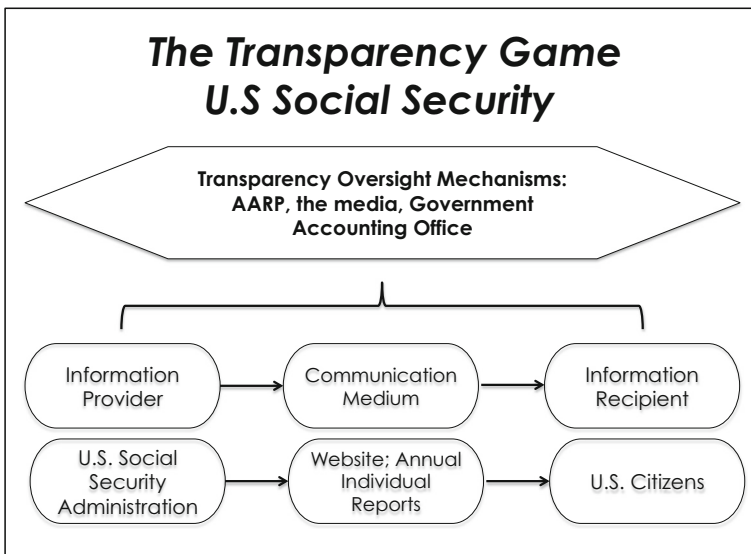


Fig. 2 The transparency game for US social security

would require some “audience” research—some deep cognitive science—to adjust and augment their methods of delivery.

Finally, there is some good news in that the receiving agent—the social security recipient—may be more equipped to notice when the supplying agency is not doing its job and do something about it.

Notice all the “mays,” “mights,” and “coulds.” There is not a clear enforcement mechanism and that is not the role of the pragmatic theory. The oversight agent could play a part in enforcement, but it may also simply be a loudspeaker, relying on others to advocate for change.

8 Conclusion

The pragmatic information theory of communication provides a foundational framework for a better understanding of information access and information transparency. The first is a fundamental component of both communication theories and theories of democratization. The second is an understudied concept, especially as it relates to how governments share information with the people. There are insights the theory gives us about both methodological issues and empirical issues associated with these theories.

8.1 Methodological

The pragmatic information-theoretic account of access provides a framework to answer the originally proposed methodological goals: (1) understanding the communication mechanism between a government and the people; (2) understanding the important role the format of the information plays for successful communication; (3) understanding the actors involved and how their skills and goals affect communication; and (4) understanding the legal constraints and motivations in the communication process, including any potential ulterior motives.

The theory improves understanding of the communication mechanism between two agents, in particular government and people, by expanding the scope of the process in a way that has not been done traditionally. Transfer of information is a necessary condition for communication. The pragmatic theory demands the conclusion that an agent has not received information if the information cannot be made a currency of the mechanisms controlling in his or her goal-directed behavior—if it cannot be made actionable. Actionability can only be understood through understanding human cognition. The communication process enters the brain. A theory of the process must enter the brain as well.

As a consequence, our theory makes us appreciate the importance of the format of the information for successful communication. This is because the format makes a difference in how it can be integrated into human cognition. Of course, in one sense this is obvious. No one doubts that format is important. The premise that the “medium is the message” has been at the foundation of modern communication theory. The medium is essentially formatted. It has been less obvious how to integrate the problem of format into a theory of human communication. To do this, we claim, we need to include knowledge about how information is processed and integrated in goal-directed

behavior in the human cognitive system. Issues, such as how the visual system works, how memory and attraction work, how biases affect perception and decision making, should not be just fancy add-ons to a theory of communication but should be part of its core.

The pragmatic theory makes the actors and their goals fundamental parts of the theory. Of course, the agent must always be part of a communication theory. But, all too often, it is treated as an opaque black box or a point in a diagram. While less opaque institutional agents, such as governments or media, have received more internal scrutiny, the human agent has not received the internal scrutiny that is required. To be fair, the state of the art in communication research is becoming more and more interested in cognitive science and neuroscience. Audience research has become a commonplace methodology. This should be both expected and commended. Our claim is stronger, however. For us, the internal complexity of the human agent (and of the social organizations it creates) should enter communication theory at a basic, conceptual level. As we have argued, the very concept of information access demands understanding of the internal working of human cognition.

We started with the question of government transparency. This is central for understanding the function of a democratic society, both empirically and normatively, and its legal environment. By moving issues of the complexity of human cognition, and thus the importance of the format of information, to the conceptual level of communication, the issues become inevitable for an analysis of information access and transparency. If one holds that under one set of subtle conditions related to information format no communication takes place, while under different conditions it takes place, then a policy related to transparency must be sensitive to the difference. The point of our transparency game was to show that this is important. In other words, by moving the issues of human cognition and information format from the state of the art in communication research to the core of the problems of communication, they immediately become subject to policy analysis.

8.2 Empirical

The pragmatic information theory of communication, and the corresponding account of information access and transparency that it provides, has strong empirical support in two ways: (1) It addresses established research in cognitive science related to how humans use information, as well as the understanding that how a message is framed makes a major difference in how it is received; (2) it predicts, correctly, that if actionability is not included in the assessment of information access, agents can cheat. The pragmatic theory gives us the theoretical tools to explain, in a very general way, why this kind of cheating is possible. The theory allows us to investigate whether information is understood in both the way it was intended and a way that is useful to the recipient—whether the usefulness was part of the intent or not. Given this, the theory can be extended to include the complex range of social factors that are a part of communications related research.

A second is that the theory allows us to better understand the application of traditional communications theories and research to contemporary situations. It is possible that different governments would disseminate information in different ways and with different purposes. Schramm's (1954) seminal volume on the "Four Types of

Media Systems” shows this. The pragmatic theory could help us see where different governments might have varied goals in information distribution and how these actions fit into the democratic form of communication.

Third, the theory helps better understand the role of communications processes in the functions of government, especially as a representation of power. Media scholar Joseph Klapper’s observations from a few decades ago highlight the true benefit of the theory. It is “very clear that the mass media [as an example of communications processes] do have important consequences for individuals, for institutions and for society and culture. ... All that remains to discover is not *whether* the media have power and how it works, but *who* has access to the use of this power” (italics in original) (Klapper 1990, p.33).

Finally, the pragmatic theory provides a mechanism for integrating actors (agents) and their motivations with environment (structure). This debate about which is more relevant to the understanding of actions and interactions brings the importance of communications processes to the forefront of research, especially research in cognitive science. A lot of the language in research describing human behavior is about inputs and outputs. This theory can provide a foundation for understanding how cognitive science ought to apply to political decision making.

The world is messy, especially when it comes to communication. This theory is a step toward making sense of a small part of this complex process: understanding information access and the related concept of information transparency.

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