

A theoretical framework for social norm perception

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*“...Norms are first external to the individual who is born in society...Thus, the psychological study of norms necessitates that we place them first on the side of the stimulus situations.”*  
Sherif, 1936, p. 66

## **1. Introduction**

An employee is trying to decide how much parental leave to take from work. A homeowner is trying to decide whether to install solar panels on her home. A high schooler is trying to decide how much alcohol to drink at a party with friends. In each of these situations, the protagonists' resulting decisions will undoubtedly weigh a wide variety of factors, but in all of them at least one factor is common: each protagonist's decision in part weighs whether the resulting behavior would fall within the range deemed acceptable or appropriate by his or her peers. In essence, each decision rests in part on the protagonist's perception of the social norm.

Behaviors and beliefs such as standards of morality (Schwartz, 1968; Sherif, 1936; Tangney et al., 2007; Treviño et al., 2006), rules of etiquette (Abrutyn & Carter, 2015; Wouters, 1995a, 1995b), cooperation (Chatman & Flynn, 2001; Ehrhart & Naumann, 2004; Fehr & Fischbacher, 2004; Fehr & Schurtenberger, 2018), racial prejudice (Crandall et al., 2002, 2013; Krueger, 1996; Paluck, 2009), and risky decisions (Gardner & Steinberg, 2005; Knoll et al., 2015; Meisel & Goodie, 2014; Simons-Morton et al., 2014) can all be traced in part to an individual's perceptions of social norms. Much of social psychological and organizational research on social norms focuses on the power of social norms to shape and alter behavior. By manipulating the perception of a social norm and measuring behavior change, scholars have been able to show that changes in the perception of social norms can create powerful behavioral change, leading to the popular norm intervention or social norms marketing paradigm (Tankard & Paluck, 2016, Paluck & Shepherd, 2012; Goldstein et al., 2008; Schultz et al., 2007; Cialdini & Jacobson, 2021; Lossin et al., 2014; Yamin et al., 2019; Mattern & Neighbors, 2004; Ayal et al., 2021). Though

this has left the field with little doubt about the potential for social norms to change behavior, norm interventions offer considerably less insight into how social norms are naturally perceived in everyday life. If one's perception of the social norm can be so influential to one's behavior, then what shapes one's perception of the norm in any given situation?

In this article we consider this question and try to offer a theoretical framework in response, providing empirical answers where available and theoretical propositions for future research when not. Our theory of how individuals arrive at their perception of social norms considers social norm perception as a three-stage process. First, individuals enter situations with a prior perception of the social norms that apply, then they encounter and weigh norm information, and finally they integrate this norm information with their prior expectation. The goal of this theory is twofold. First, a theory of social norm perception should help researchers better identify cases in which social norms are likely to be misperceived. These situations are critical in that they form the ideal circumstances for social norm interventions to bear fruit (Miller & Prentice, 2016). Second, a theory of social norm perception should help researchers and practitioners understand how to change social norms by identifying both psychological levers that are particularly powerful in shifting perceived norms, and roadblocks that are particularly pernicious in resisting such changes.

### **1.1. What is a Social Norm?**

Before considering social norm perception, we must first have a clear understanding of what defines a social norm. In this article we will not review the differences in definitions and terminology used across the wide variety of disciplines and methods for which social norms are central constructs (for such a review see Dannals & Miller, 2017a; Gelfand et al., 2024; or

Morris et al., 2015; or for a comprehensive review of reviews see Legros & Cislighi, 2020).

Instead, our goal is to offer a definition of social norms that holds reasonable consensus within current literature and to offer when the study of social norm perception in particular requires deviations from common definitions provided by other scholars.

We define social norms by two components: a descriptive social norm and a prescriptive social norm, which we will refer to as the descriptive norm and prescriptive norm for brevity. The descriptive norm describes the average or most common behavior or range of behavior that is enacted in a situation (Cialdini, Kallgren, & Reno, 1991; Cialdini, Reno, & Kallgren, 1990; Reno, Cialdini, & Kallgren, 1993). The descriptive social norm is in line with Bicchieri's (2016) empirical expectation, which captures a belief in what most people do. In contrast the prescriptive norm describes the behavior or range of behavior that group members believe should be enacted or alternatively the behavior or range of behaviors that are viewed as acceptable or appropriate to be enacted in the situation (Dannals & Miller, 2017b; Scharding & Warren, 2024). For our purposes we will consider the prescriptive norm to be the inverse of an injunctive norm (Cialdini, Kallgren, & Reno, 1991; Cialdini, Reno, & Kallgren, 1990; Reno, Cialdini, & Kallgren, 1993): prescriptive norms indicate what should be done, while injunctive say what should not be done. While in principle these two categories in combination may not describe all possible behavior (i.e. an action that should not *not* be done does not necessarily imply it *should* be done), we will assume in this article that prescriptive and injunctive norms are equivalent but inverted for simplicity. This is in line with cognitive frames, also known as decision frames or simply "frames" and persuasive communications in which advice and techniques can be presented either as a proscription or as a prescription (Pavey, Churchill, & Sparks, 2022; Tversky & Kahneman, 1981).

Both components are properties of a group or community rather than of an individual. The descriptive norm is often measured by taking the mean of recorded behavior (e.g., reading households' electricity meters to obtain energy usage behaviors, Schultz et al., 2007) or by taking the mean of self-reported behavior (e.g., mask wearing during the COVID-19 pandemic, Heiman et al., 2023). The prescriptive norm can similarly be measured by first asking individuals in the relevant group directly about what behavior is acceptable or appropriate (e.g., Brauer & Chaurand, 2010), or by noting behaviors for which one would face negative judgments or punishments, thus delineating the boundaries of this range of acceptability (Eriksson et al., 2021), and then determining the average or most common belief within this community. The perceived descriptive and prescriptive norms are thus an individual's subjective perception of these properties of a group, which may or may not be accurate compared to certain benchmarks.

In order to measure either the objective descriptive or prescriptive norm or an individual's subjective perception of these variables, it's also necessary to define the reference group, or the set of individuals to whom this norm applies, and within which one might expect to be held accountable for any violations of the norm. The reference group may be an informal group of friends (Baer, Stacy, & Larimer, 1991), a team of individuals (Dannals & Miller, 2017b), a profession (e.g., life scientists, see Haas & Park, 2009; healthcare workers, see Tang et al., 2021), an organization or cooperative (Hackman, 1992; Kolstad, 2007), a geographically defined neighborhood or location (e.g., among neighbors, see Schultz et al., 2007; among hotel guests, see Schultz, Khazian, & Zaleski, 2008), a demographic group within any of these prior categories (e.g., gender see Lewis & Neighbors, 2007; race see Edwards, Witkiewitz, & Vowles, 2019), or a larger country or culture (Eriksson et al, 2021).

While many researchers considering social norms focus on country-level differences (Gelfand et al., 2011; Hofstede, 2001; House et al., 2004), social norms operating at this level are more difficult to examine causally in studies of social norm perception. In order to causally study social norm perception researcher must be able to manipulate elements of a situation such that individuals perceive different social norms as a result of the manipulation. This often requires that the norms manipulated have multiple plausible equilibria with regards to behavior, e.g. a group of friends drink a lot or a little, a community recycles more or less, a group of employees that work mostly from home or the office. In the case of country-wide social norms, it's implausible to imagine shifting an individual's perception of something so seemingly universal in an experimental paradigm. Instead, researchers here often use cross-cultural research designs to draw comparisons between the perception of the same norm in different countries (Chan, Udall, & Tam, 2022; Culiberg & Elgaaied-Gambier, 2015; Eom et al., 2016; Eriksson et al., 2021; Shen, Wan, & Wyer, 2011). While this offers insight into the ways in which norms differ in different contexts and cultures, cross-cultural comparisons make it difficult to isolate the particular feature of norm perception that differs because so many characteristics that might affect perceived social norms vary between countries. We will therefore primarily focus on social norms which operate locally, though we expect much of our theorizing could also apply to social norms that govern larger collectives.

While social norms have both descriptive and prescriptive components, in order for a given behavior to be viewed as governed by a social norm, some level of prescription must be present. Thus, often when scholars reference just "the social norm", they tend to mean the prescriptive social norm (Bicchieri, Muldoon, & Sontuoso, 2018; Legros & Cislighi, 2020). The strictest definitions of social norms forgo considering descriptive norms in favor of focusing

solely on behaviors for which some element of punishment or judgment is present (Benabou & Tirole, 2011; Bicchieri et al., 2018; Fehr & Fischbacher, 2004), but this is ill-suited for the investigation of social norm perception because individuals may observe behavior without observing punishment, but assume, given a requisite amount of consistency in that behavior, that punishment likely also occurs when necessary. (We will discuss the related naturalistic fallacy (Moore, 1903/1993) further below when considering individuals' starting expectations of social norms.) Because of this relationship between descriptive and prescriptive norms, an investigation of perceptions of social norms must include a consideration of perceiving descriptive norms in order for it to inform how individuals form perceptions of prescriptive norms, even if one holds a view of social norms as defined only by their prescriptive elements (e.g. Benabou & Tirole, 2011). Because of the interconnectedness of descriptive and prescriptive norms, when considering how individuals perceive social norms, we will consider how individuals weigh both descriptive information and prescriptive information.

## **1.2. Why Do Individuals Seek Accurate Perceptions of Social Norms?**

Though often taken for granted, it's worth considering why individuals might be motivated to form an accurate perception of the social norm because these motivations might offer important context into how individuals go about fulfilling this goal. Deutsch and Gerard (1955) outlined the two most core reasons why individuals might want to learn the social norm namely informational influence and normative influence. Informational influence references following a social norm because you have learned something about the utility of that behavior (Deutsch & Gerard, 1955). People might therefore want to learn the social norm in order to understand what the best option might be. For example, retailers might highlight prior customers

decisions because they know new customers place greater value on popular options (Bearden & Etzel, 1982; Bearden, Netemeyer, & Teel, 1989; Burnkrant & Cousineau, 1971; Pincus & Waters, 1977). Many examples of informational influence would not necessarily rise to the level a social norm being present, given a requirement that a social norm has some element of prescription. For example, imagine an individual at a restaurant learns of that the most popular dish for previous customers was the fried chicken but decides to get a salad. If other customers would judge one negatively for this decision, then a prescriptive social norm, albeit a weak one, may be present. However, more likely other customers would view this as a matter of personal preference and therefore though one may have learned that the fried chicken is better than the salad as a result of descriptive information, most norms scholars would not view this as a case of social norm influence. Again, however, whether this is a case of norm influence per se is less important to the study of social norm perception. The question instead is whether there are cases in which individuals seek to learn the average behavior within a situation because they view this as giving them important information about the best option, and in which they assume that if they do not enact the best option, they will face social consequences of some form. It seems easy to generate examples where this would be the case.

Deutsch and Gerard's (1955) second form of social influence is by far the most commonly cited reason for which individuals wish to learn social norms: normative influence. Normative influence describes occasions in which one complies with the norm in order to fit in or belong to a group. Failure to comply often results in ostracism (Hales, Ren, & Williams, 2017; Schachter, 1951; Williams, 2009), gossip (Beersma & Van Kleef, 2012; Foster, 2004; Peters et al., 2017), or other social consequences (e.g., reprimand, see Henry et al., 2000, Wilder, 1990; ridicule, see Boehm, 1999, Wooten, 2006; social stigmatization, see Salvy et al., 2007).



Ostracism refers to the act of excluding or ignoring individuals by other group members (Hales, Ren, & Williams, 2017). Individuals can be ostracized in close interpersonal relationships, informal groups, or formal organizations and societies (Williams, 2009). Ostracism is an adaptive response undertaken collectively by group members to motivate deviant members to obey social norms or to permanently remove members who refuse to conform (Wesselmann, Williams, & Wirth, 2014). Individuals may also be motivated to learn social norms in order to avoid negative gossip, the exchange of information with evaluative content about absent third parties (Beersma & Van Kleef, 2012). The pressure of normative influence, and ensuing fear of ostracism and gossip, can be so substantial that individuals internalize this as feelings of shame or guilt when violations occur (van Kleef, Wanders, Stamkou & Homan, 2015), feel a weaker sense of overall belonging and social capability (Gomilla & Paluck, 2020), and can result in a lower sense of self-esteem (Morrison & Miller, 2010).

The overwhelming prominence of normative influence explanations for social norm perception has diminished consideration of the degree to which individuals may have additional reasons beyond informational or normative influence for wanting to accurately perceive these social norms. For example, individuals might want an accurate perception of the social norm in order to intentionally stand out and behave differently from the majority. This intuition is hinted at in Brewers (1991) seminal work on optimal distinctiveness which highlights that individuals both want to be a part of and maintain a separate identity from a group. Furthermore, it may sometimes be a strategic advantage to knowingly go against what most people are doing even if this means that you face some social punishment from those individuals because the rewards are large enough (Liu, Lu, & Veenstra, 2014; Gomilla & Paluck, 2020). In both cases, individuals

have an incentive to understand what most people think they should do, even though their intention is not to enact that behavior but instead to knowingly go against the grain.

In addition, individuals may wish to have an accurate perception of the social norm even if not planning to behave within those bounds in order to calibrate the degree to which they need to make recompense or apologize to others. If the norm violated is very strong, one's apology should be equally strong (Cels, 2017; Fehr & Gelfand, 2010). In this case individuals might know with certainty how they will act in a future situation but nonetheless view how most people would act as valuable information because it allows them to calibrate how costly their action is and therefore salvage or maintain relationships (Chaudhry & Loewenstein, 2019).

### **1.3. Comparing Social Norm Perception to Category Perception**

#### **1.3. The Need for Stronger Theory in Social Norm Perception**

Two distinct but intertwined phenomena suggest that current theory on social norm perception is inadequate. First, research consistently documents misperceptions of social norms, but offers little theory about what norms are likely to be misperceived when. According to prior research, people inaccurately perceive the degree of their peers' approval for guns rights legislation (Susman et al., 2022), support for diversity-benefiting policies (Isenberg, 2023), concern about climate change (Sparkman, Geiger, & Weber, 2022), frequency of alcohol consumption (Miller & Morrison, 2009; Prentice & Miller, 1993; Rinker et al., 2017; Schroeder & Prentice, 1998; Suls & Green, 2003), frequency of drug use (Barman-Adhikari et al., 2017; Brener et al., 2015; Hines, Saris, & Throckmorton-Belzer, 2002), desire for cross-race interaction (Shelton & Richeson, 2005), frequency of sexual activity (Chia & Lee, 2008); frequency of

sexual harassment in the workplace (Carr et al., 2000; Halbesleben, 2009), adherence to vegetarianism (Kitts, 2003), support for corporate strategy (Westphal and Bednar, 2005), support for women's workforce participation (Bernhardt et al., 2018; Bursztyn, González, & Yanagizawa-Drott, 2020), and childhood vaccination rates (Dixon, Lerner, & Bashian, 2024).

Accurately perceiving social norms is a complex task and is therefore hardly surprising that misperceptions are so frequent. However, in order to move beyond documenting gaps in accurate perception and towards a theory of when, how and why such gaps arise, the field requires a stronger theory of how individuals first arrive at their perceptions descriptive and prescriptive norms. Do individuals tend to incorporate or overweigh some norm information that misleads them and should be discounted? Are some behaviors more vulnerable to this than others? Which individuals misperceive norms the most? Current theory offers limited answers to these and other related questions.

In addition, interventions using social norm information have often yielded less predictable results than extent theory would suggest. File drawer problems may downplay the degree to which past norm interventions offer mixed effects because null findings prove more difficult to publish (Rosenthal, 1979). Dellavigna and Linos (2022) offer evidence of the potential scope of this concern. They examine the degree of success of a variety of nudge experiments, including the providing of social norm information, implemented by the Behavioral Insights Team in North America and the Office of Evaluation Sciences. Though social information nudges published in academic journals induced an average 13.81 percentage point change in behavior, those conducted by the nudge units induce only an average 0.81 percentage point change in behavior with considerable heterogeneity. This suggests that there are likely many situations in which current theory on social norms incorrectly predicts that providing social

norm information should shift behavior. While it's possible that this is because social norms themselves have less influence on behavior than prior work would suggest, it's equally plausible that these findings indicate instead that social norm interventions are less reliable at shifting perceptions of social norms than prior theory would indicate. By developing stronger theory about how social norm perceptions are formed and changed, we might better understand when social norm interventions can successfully shift perceived norms and thus behavior. While we do not contend that a theory of social norm perception will resolve all of these concerns, it is our hope that the framework we provide serves as a first step towards doing so.

## **2. Three Stages of Social Norm Perception**

We theorize that norm perception takes place in three stages. First, individuals enter situations with starting expectations about the descriptive and prescriptive norm for that situation. Individuals then encounter norm information and form a summary of this information. Finally, individuals integrate the new information into their starting distribution creating an updated perception of descriptive and prescriptive norms. In the following subsections we will consider each of these steps in turn.

### **2.1 An Individual's Starting Expectations**

Imagine an individual enters a situation for which she has no comparable prior experiences. Though this is inherently implausible in organizational contexts, it's helpful to consider the most minimal case of social norm perception before taking into account the inevitable complications of reality, just as cognitive science often invents unknown objects in order to elucidate the perception of real groups or categories (c.f. Bear & Knobe, 2017).

Upon entering the situation, she knows that a behavior,  $A$ , will be enacted in this situation. We can categorize her perception of the descriptive social norm as the probability distribution,  $D(a)$ , which captures her expectation of the probability of individuals in this situation enacting various levels of  $a$ , and her perception of the prescriptive norm as the probability distribution,  $P(a)$ , which captures her expectation of the probability of each level of  $a$  being judged by others in the situation as an acceptable or appropriate action.

Based on prior research, we theorize that before any norm information is encountered,  $D(a)$ , can be categorized by two features. First, the distribution is ego-centric, meaning that the behavior defined as maximally probable, is equal to the individual's own private propensity to enact the behavior, or  $\operatorname{argmax} D(a) = a_i$ , where  $i$  identifies the individual perceiving the norm. Individuals often believe that their behavior, attitudes or beliefs are shared with or similar to others, especially similar others, a phenomenon in social psychology known as social projection (Krueger, 2007). Katz and Allport (1931) first reported on this ego-centric perception bias, finding that individuals who admitted to cheating on exams in college expected cheating to be of higher prevalence among their peers than those who reported never cheating. This tendency has also been examined within research on the false consensus effect (Ross, Greene & House, 1977), which describes the phenomenon in which individuals over-estimate the degree to which their beliefs or attitudes are shared with others, i.e. are held in consensus (see Marks & Miller, 1987 and Krueger & Clement, 1994 for review). Though these effects have often been explained as processes founded in bounded cognition or self-serving motivations, in this case, we make no arguments about rationality of anchoring on one's own behavior (c.f. Dawes, 1989). Given prior empirical evidence of the prominence of egocentrism in one's resulting perception of the

community, we suggest only that absent other information, individuals assume their own behavioral tendency is likely shared by others.

Second, we theorize that this egocentric perception is weak, which is to say that while individuals believe their own behavior to be the most commonly enacted behavior by others, they also view deviations as quite plausible. Though  $D(a)$  could in principle take any number of functional forms, consider it as a Gaussian distribution,  $D(a) = \mathcal{N}(\mu^2, \sigma^2)$ . The variance of this distribution,  $\sigma_{D(a)}^2$  then captures an individual's expectation of others' deviations from their own preferences at baseline. Variance is less commonly considered in social norms research, perhaps because it is less intuitively understood (e.g. Rossi & Berk, 1985), however this theorizing most closely aligns with Gelfand and colleagues (2011) conception of tight or loose cultures. Cultural tightness captures four correlated features of a tight culture: (1) the number of behaviors governed by social norms in a society, (2) the degree to which individuals agree on their perceptions of social norms, (3) the degree of variability of behavior allowed within the social norm, and (4) the severity of punishment that is appropriate for norm violations. The third characteristic described suggests that for those raised in culturally loose environments, we might expect a greater starting  $\sigma_a^2$  as compared to individuals raised in more culturally tight environments. This is to say that even absent any specific information about a situation, general exposure to cultural tightness might socialize individuals to expect less variability generally.

Third, we theorize that even before exposure to norm information, one's perception is naturalistic, which is to say that individuals expect a high correlation between descriptive norms and prescriptive norms. Under the strongest case of this,  $D(a) = P(a)$ , meaning that a behavior is as likely to be judge appropriate as it is probable to occur. Certainly, it seems likely that  $\mu_{D(a)} = \mu_{P(a)}$ , given that social projection applies both to the perceived behaviors and the perceived

attitudes of others (Monin & Norton, 2003). One might further expect that  $\sigma_{P(a)}^2 = \sigma_{D(a)}^2$ . The naturalistic fallacy suggests that individuals generally view common behaviors as moral and moral behaviors as common (Lindström et al., 2018). Furthermore, research by Bear & Knobe (2007) and Eriksson, Strimling, & Coultas (2015) similarly suggests a tight correlation between descriptive and prescriptive inferences, further supporting the notion that we might generally expect  $D(a) = P(a)$  in one's starting expectations. However, it's also plausible that in tighter cultures  $\sigma_{P(a)}^2 < \sigma_{D(a)}^2$ , which is to say that as behaviors deviate from the self, they become less acceptable than they are common. If individuals in tight cultures are used to some levels of a behavior being enacted but punished (e.g. Anderson & Dunning, 2014; Gelfand et al., 2011; Triandis, 1989), they may naturally assume that behavioral tendencies,  $D(a)$ , must be constrained by prescriptive norms. Similarly in particularly loose cultures, one might imagine that  $\sigma_{P(a)}^2 > \sigma_{D(a)}^2$ , which is to say that deviations from the self are acceptable even if uncommonly enacted. A general tendency towards pluralism or tolerance of deviance in looser countries (e.g. Gelfand et al., 2011; Triandis, 1989) might similarly socialize individuals to assume that a wide variety of behavior is acceptable even if it is not how most people behave.

While these principles suggest one's starting expectations when entering a novel situation, outside of hypothetical experiments, it's rare that an individual would enter a situation that is entirely novel. With regard to social norm perception, situations instead generally fall into two categories. Some situations might be thought of as repeated situations, those in which one expects that the schema of the situation is the same in later iterations it was in first exposure: every day that one goes to the office, one expects roughly the same set of schemas to apply. A situation is repeated to the extent that one would expect a previously experienced  $D(a)$  and  $P(a)$  to apply without alteration to the currently experienced situation. Furthermore, prior research

suggests that over time, if a situation is sufficiently repeated, the perceived social norm may be internalized and taken-for-granted, leading individuals to largely stop attending to new social norm information.

In contrast, other situations can be thought of as not repeated but related situations, those for which one has previously experienced elements of the current situation but expects a sufficient departure from prior situations to require adjusting  $D(a)$  and  $P(a)$ . For example, while one might have strong norms for going to one's regular daily office, if on a business trip to a branch of the company in New Orleans, one might expect similar but not identical norms. In these cases, we can consider  $D(a)$  and  $P(a)$  to be generated via a combination of the prior relevant situations. Sparkman and Weber (2023) suggest that social norms exist in a network of related beliefs, Dalege, Galesic, & Olsson (2024) offer a broader but conceptually similar account of how all beliefs an individual might hold, both personal and social, might be conceptualized as a network, as do Vlasceanu, Dyckovsky, & Coman (2023) in their BENDING (Beliefs, Evidence, Norms, Dynamic Information Networked Graphs) model. One might also consider the starting expectations in related situations to reflect Kahneman and Miller's (1986) description of category norms. In this case, the specifics of the situation, e.g. "business office" and "New Orleans" for the work trip described above, might be considered the stimulus which pulls from past social norms for "business office" as well as "New Orleans" to generate an expectation which combines elements of both. In such cases, one might expect the resulting distributions to have greater expected variance than either of its constituent parts to account for the uncertainty of the combination (Ostroff & Fulmer, 2014).

## **2.2 Encountering Norm Information**



Given this starting expectation, an individual then enters a situation and encounters signals of the social norm. Most research on social norm perception relates not to the starting expectations that we have considered up until this point, but rather to how individuals summarize, weigh, and incorporate the norm information they then encounter. In these circumstances, we consider what form norm information often takes, what information individuals are likely to have access to, and how accurately individuals perceive such information.

At this stage individuals are forming a perception of  $D_s(a)$  and  $P_s(a)$  where each is defined as an individual's best approximation of the probability distribution that would generate norm information one encounters. While some information may hold stronger relevance to prescriptive norms rather than descriptive norms, we suggest that most information is first incorporated into one's descriptive norm perception and then prescriptive norms shift in order to maintain the correspondence described above.

We will assume that individuals accumulate information via a weighted linear combination of the signals they receive, in line with DeGroot (1974) learning, such that  $D_s(a) = \frac{\sum_{j=1}^n w_j D_j(a)}{n}$  and  $P_s(a) = \frac{\sum_{j=1}^n w_j P_j(a)}{n}$ , where  $w_j$  is the weight an individual subjectively assigns to information  $j$  and is bounded from 0 to  $n$  with  $\sum_{j=1}^n w_j = n$ , where  $n$  is defined as the total amount of information one receives. Each piece of information,  $j$ , that an individual encounters is summarized by the individual as  $D_s(a)$  or  $P_s(a)$ , representing the individual's sense of the underlying probability distribution which most likely gives rise to the information they encounter. When all norm information encountered pertains to the same number of individuals (e.g. serial observation of individuals, or multiple statistics representing groups of the same size), one might say that an individual "overweighs" information relative to a rational benchmark of

the arithmetic mean if  $w > 1$ . Similarly, if  $w < 1$ , one might say that an individual “discounts” the observed information relative to other information he or she encountered.

### 2.2.1 Types of Norm Information

Individuals receive norm information in a variety of ways, with some forms of norm information likely receiving greater weight than others. One approach to studying norm perception is thus to consider the possible sources of norm information and any systematic patterns in the weighting of these different sources. Individuals learn social norms by observing other’s behavior in their environment (Cialdini, Reno, & Kallgren, 1990) or in the media (Paluck, 2009), hearing advice or statements about the norm (Goldstein, Cialdini, & Griskevicius, 2008), hearing gossip about specific incident (Baumeister, Zhang, & Vohs, 2004), observing institutional action (Hodgson, 2006; Tankard & Paluck, 2016), and observing positive or negative reactions to others’ actions (Hareli, Kafetsios, & Hess, 2015).

We can consider these as operating along two dimensions. The first, *specificity/generality*, captures the degree to which the information describes a small portion of the reference group or the entirety of the reference group. Information might be highly specific, e.g. the observation of a single person’s behavior, or highly general, e.g. a statistic about the average behavior of all students at a college, or somewhere in between, e.g. the observation of a small group of people over time. The second dimension, *transparency/filtration*, captures how directly the information was obtained. First-hand observation can be considered the lowest filtration or the highest transparency, while information from the media or gossip networks might be considered highly filtered in that the information has gone through many others before being perceived by the target individual. We depict these two dimensions in Figure 1. Though separable, these two dimensions are often correlated: specific information can easily be low in

filtration, but general information is more often encountered at least a few steps removed from direct observation, yielding a general correlation.

The task of perceiving and weighing new norm information in order to form  $D_s(a)$  and  $P_s(a)$  varies as a function of these two dimensions. When individuals encounter specific information, their task is one of aggregation. For example, consider an individual observing a group of friends ordering sequentially in a restaurant and trying to determine the underlying norms for alcohol consumption. He or she might average the behavior of the group, perhaps weighting some friends' behavior more than others, thus aggregating specific observations to the more general property of the social norm. When individuals encounter filtered information, the task is instead to try to adjust the information to account for the distortions that filtration imparts. For example, consider an individual instead receives advice before the dinner from a friend in common, suggesting that this group of people tends to drink heavily. This information is more general because it pertains to the entire group rather than specific individuals, but is also more filtered, because it is relayed through another person's perception of that norm.

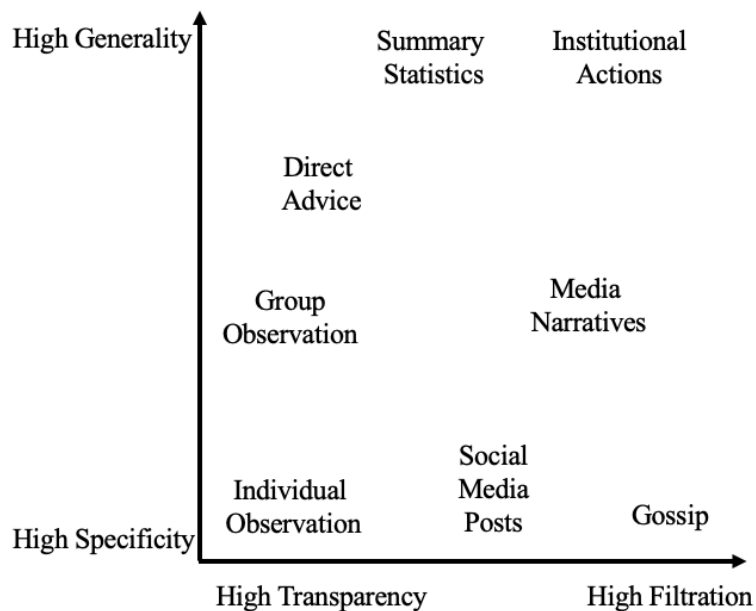


Figure 1. Common forms of social norm information as a function of *transparency/filtration* and *specificity/generality*

### 2.2.1.1 Specific and Transparent Information

The most common norm information individuals encounter comes not from an intervention message but rather from one's own daily observations of the behavior of those around them. This includes much of traditional social learning paradigms where individuals observe others enacting behaviors like aggression (Bandura, Ross, & Ross, 1961), health behaviors (Louis et al., 2007), environmental behaviors (Cialdini, Reno, & Kallgren, 1990), or (im)moral behaviors (Moberg, 2000; Nook et al., 2016). Studies documenting peer effects might also be considered within this category. Though peer effects needn't operate via social norms, many studies showing product adoption (Fisher & Price, 1992) or policy take-up (Bertrand et al., 2000) might be considered to have a component of social norms in that the target individual

observes a peer enact a behavior and updates his or her perception of its commonness and acceptability.

Some specific transparent information might be given greater weight in one's perception when the person enacting the behavior is viewed as particularly diagnostic of the social norm. Dannals, Reit, and Miller (2020) find that individuals give greater weight to the behavior of lower ranking individuals when perceiving descriptive social norms in teams. In contrast, other work suggests that the behavior of leaders may be given greater weight in perceived norms (Hogg & Reid, 2006). This may be particularly true if leaders are chosen democratically and thus viewed as a representative of a typical follower in the group (Syfers et al., 2022) or if the leader rises to power as a result of being a prototypical group member (Hogg & Reid, 2006). Prior research suggests that the behavior of similar others is particularly influential in influencing one's own actions via social norms (Fielding & Hornsey, 2016). Though little research directly examines the weight one gives to the behavior of similar versus dissimilar others in perceived social norms, this work would suggest that individuals likely weigh the behavior of similar versus dissimilar others more in their perceptions of the social norm.

Perhaps the most referenced reason to differentially weigh observed behavior is the status of the target. When learning from others evolutionary theory suggests that individuals look to those they believe most competent at the relevant task and this competence is generally rewarded with status or prestige, leading status itself to become an indicator of competence (Horner et al., 2010; Kendal et al., 2015, 2018; Carr et al., 2015; Flynn et al., 2016; Henrich & Broesch, 2011; Henrich & Gil-White, 2001). This pattern yields a prestige-bias in social learning, wherein individuals prefer to learn from those of high status or prestige rather than those without such rank. However, when taken into the domain of norm perception, this pattern can become

tautological. Status and prestige are often defined by measuring individuals who influence others behavior (e.g. “how much did this group member influence group decisions,” Anderson et al., 2006) or manipulated by showing others following the group member’s behavior (Chudek et al., 2012). When operationalized in part as influence itself, status or prestige may thus be a circular input into norm perception. However, in some cases status or prestige may be operationalized via credentials (e.g. a more impressive resumé; Roberts, Palermo, & Visser, 2019) or by perceived competence to the group (e.g. “how much did this person demonstrate high ability,” Anderson et al., 2006) or as general visibility or prominence within the group (Anderson et al., 2001; Paluck & Shepherd, 2012), each of which might separately contribute to giving greater weight to an individual’s behavior in the perception of the norm.

In addition to weighing specific and transparent information differently as a function of the target’s characteristics, the weight given to specific information might be distorted by cognitive heuristics. Dannals and Miller (2017b) found that individuals sometimes anchor on extreme observations, those where a single individual behaves very differently from the rest of the group and thus overweight them in the perceived social norm. Goldenberg and colleagues (2021) replicated this pattern showing that extreme emotional expressions, defined as those high in valence rather than extreme relative to other expressions in the group, are given greater weight in one’s perception of group emotion. In addition to distortions caused by observation extremity, individuals may anchor on earlier observations and give them greater weight in the perceived social norm (Yudkin, Yin, & Schweitzer, 2022). Similarly, Silverman et al. (2023) found that a more recent sequences of goal-consistent behaviors enhances the anticipated probability of these behaviors persisting. Such a streak significantly affects psychological perceptions of behavior likelihood in the future, in contrast to other behavioral patterns, even when the rate of all

behaviors remains unchanged. This phenomenon can lead individuals to erroneously overestimate the general likelihood of these behaviors occurring. Though relatively little research has examined the effect of heuristics and biases on the processing of norm information, it's plausible that many of the heuristics and biases found by prior research to affect the perception of probabilities or uncertainties (e.g. Tversky & Kahneman, 1982) may apply to social norm perception.

### **2.2.1.2 Specific and Filtered Information**

In contrast to this high transparency information, sometimes the norm information one encounters has instead iterated through several others before reaching the focal individual as part of a game of telephone. The two most common examples of this form of information are gossip and social media posts. Gossip, defined as the exchange of information about someone when he or she is not present (Foster, 2004), is inherently filtered by the individuals who have passed it along and varies in degree of filtration as a function of whether the gossipers observed the incidents themselves or are passing along another's observations. Social media posts also vary on filtration. Some posts may be photographs or videos directly representing an action that occurred (lower filtration), while others may be repeating another's actions without observation (e.g. retweets; higher filtration). However, even most transparent social media post is inherently somewhat filtered for two reasons. First, when encountering norm information on social media, the perceiver does not directly observe the source of the norm information, which allows the source to selectively contribute or alter the information they provide (e.g. Instagram posts that use digital photo alterations to improve perceived fitness and attractiveness; Vendemia & DeAndrea, 2018). Second, most social media posts are selectively displayed to users as the result of an algorithm which adds an additional layer of filtration.

Gossip is ubiquitous across social groups and cultures (Eriksson et al., 2021). Though individuals gossip for many reasons, one key function of gossip is to discourage counter-normative behavior (Baumeister, Zhang & Vohs, 2004; Beersma & Van Kleef, 2012; Peters et al., 2017). Gossip often spreads reputational information, such as communicating individuals who free ride in a public goods game (Feinberg, Willer, & Schultz, 2014; Feinberg et al., 2012). This reputational information not only communicates knowledge about an individual actor (e.g. “John is a free-rider”) but also indirectly communicates normative information, (e.g. contributing nothing to the public good is both unacceptable but not entirely uncommon).

Little research directly compares how individuals weigh information obtained via gossip as compared to direct observation, but prior research offers some evidence for how individuals might weigh filtered information such as gossip relative to more transparent norm information. The elaboration likelihood model suggests that individuals weight the source credibility of persuasion attempts, particularly when processing information more heuristically or peripherally (Jones, Sinclair, & Courneya, 2003). It seems plausible that individuals generally weigh gossip that they learn from more credible sources more than those with features that signal lower knowledge or trustworthiness (Lee & Barnes, 2021). However, even gossip from most credible source is likely weighted less in one’s perception of the norm as compared to one’s own observations. Conlon and colleagues (2022) find that individuals in a probability task use information relayed by others, and even in some cases directly observed but enacted by others, significantly less than information learned from one’s own experience with the task. Future research might investigate how individuals differentially evaluate gossip in perceived norms as a function of both source characteristics and the degree of filtration from personal experience.



In addition to learning specific norm information via gossip, individuals gain a variety of social norm information from social media (Masur, Bazarova, & DiFranzo, 2023; Gottfried, 2024). While some social media information is more general than others, all social media posts are filtered to some degree in that the individuals who post to social media platforms selectively reveal some information and not others and algorithms selectively determine which posts to display more prominently than others. This algorithmic filtering is particularly important to consider because, unlike the filtration one experiences when hearing gossip, algorithmic filtration is generally less salient and sometimes largely invisible (Acerbi, 2019). Brady and colleagues (2023) suggest that algorithmic filtration can interrupt traditional social learning leading to misperceptions, including misperceived social norms. Evolutionary theory suggests that individuals traditionally associate information that garners more attention as valuable or shared because the attention spent by others is a meaningful signal of value (Henrich & Gil-White, 2001). However, algorithms can encourage greater attention towards posts for reasons unrelated to anything of value that would have warranted such attention absent the algorithm's intervention (Arugute, Calvo, & Ventura, 2023; Brady et al., 2023). Social media feeds are thus sources of norm information that are largely invisibly filtered, leading individuals to give greater weight to posts they observe than they might were they to understand this distortion (Brady & Crockett, 2024).

Though we have discussed reasons why filtered norm information, especially in the form of gossip, might be weighted less than less filtered observations, two streams of research suggest important caveats to this discussion. First, when a behavior is generally rare or private, it's possible that the only sources of norm information available about this behavior are filtered. We will discuss this consideration below in Section 2.2.3. Second, even if the filtered information

one encounters appears on the surface to lack credibility, it's difficult for individuals to discount it entirely because comprehending information requires an initial level of belief in the information (Gilbert, Krull, & Malone, 1990; Gilbert, Tatarodi, & Malone, 1993). As a result, when individuals encounter information, even if it is false, they may continue to believe it or act on it, particularly if they process the information while distracted or are interrupted while learning it. Studies demonstrating these effects did not specifically examine social norm information, but they raise questions about to what degree individuals can successfully down-weight specific and filtered information in their perception of a norm when they view it as inaccurate or unreliable.

### **2.2.1.3 General and Transparent Information**

In contrast to specific information, which must be aggregated up to an overall impression of the reference group, when people encounter general information, another individual or institution has already aggregated behavior and conveys summary rather than specific details. All general information is thus somewhat less transparent than the equivalent specific information. However, we can still consider relative degrees of transparency within this more restricted range. Perhaps the most transparent of general information comes from the advice or statements that others make conveying their perception of the norm for a situation. Both job candidates and newcomers seek out information including feedback from current employees in organizations in order to understand organizational culture (Ashford & Black, 1996; Miller & Jablin, 1991; Morrison, 1993, Saks & Ashforth, 1997). Dannals, Reit & Miller (2020) suggest that individuals prefer to gain such general advice from lower ranking as compared to higher ranking employees when motivated to gain accurate information. However, little work compares

such summary information on culture to more transparent sources of information or examines how individuals integrate and weigh different sources of such advice.

In addition to general advice from peers or coworkers, most social norm interventions provide high generality information that aims to emphasize general transparency. The goal of social norms marketing interventions is to provide individuals with summary statistics about the reference group's behavior, sometimes directly indicating the source of the statistic, e.g. "X% of (school name) students" (DeJong et al., 2009; Mattern & Neighbors, 2004) or "data drawn from the XXX Survey conducted on a random sample of (school name) students with *N* respondents" (Burchell, Rettie, & Patel, 2012), in order to provide confidence in the low degree of filtration (Miller & Prentice, 2016). Researchers, policymakers, and practitioners strategically employ these explicit statements of social norms in an attempt to influence individuals' behaviors in the real world. By highlighting the common or acceptable actions of certain reference groups, these explicit statements aim at influencing individuals' perceptions of both descriptive norms and prescriptive norms and nudging individuals towards engaging in more prosocial behaviors or behaviors resulting in positive impacts as well as discouraging antisocial behaviors or behaviors with negative externalities. Prior empirical works have demonstrated the effectiveness of explicit social norm statements on behavioral changes both in the laboratory and in the field. This approach has been successful in influencing a variety of behaviors, from promoting prosocial behaviors such as climate change mitigations (Cialdini & Jacobson, 2021), environmental sustainability (Lossin, Loder, & Staake, 2016; Yamin et al., 2019), and charitable donations (Nook et al., 2016), to reducing undesirable behaviors with negative externalities such as alcohol consumption (Mattern & Neighbors, 2004), tax evasion (Abraham et al., 2017), and fare evasion (Ayal, Celse, & Hochman, 2021).

When providing general information whether in the form of direct advice or intervention campaigns, individuals weigh the information more as a function of believability or credibility. Though to our knowledge, no one has studied source effects on direct norm advice, a variety of other literatures offer insight into how individuals might weigh such information. Signals of integrity-based trust (Levine & Schweitzer, 2015; Mayer, Davis, & Schoorman, 1995; Zlatev, 2019) may lead to greater weighting of norm advice. Individuals may discount advice from those who they perceive likely to be biased due to group membership or demographic features (Torrez, Dupree & Kraus, 2024; Wallace, Craig, & Wegener, 2024). Individuals may choose to weigh information that is in line with their personal preferences or motivations more, in line with theories of motivated perception (Lench et al., 2014; Spencer et al., 2003). Intervention research has similarly shown that believability and credibility of the information provided moderates the efficacy of norm interventions on alcohol consumption (Glazer et al., 2010; LaBrie et al., 2010) and smoking cessation (Her & Oh, 2023). This is of particular concern because the summary statistics used in such interventions are often least believable to participants whose perceptions are most inaccurate and thus most need the intervention (Granfield, 2002). This general tension, between what one observes and the summary information that is communicated by others, parallels studies of diversity dishonesty in which minority employees experience specific signals that the organization does not value diversity even while organizations communicate the importance of such diversity using general information (Wilton et al., 2020).

#### **2.2.1.4 General and Filtered Information**

In some cases, the information one encounters is similarly high in generality but passes through additional layers of filtration. Norm interventions may vary in level of filtration, with some emphasizing transparency (e.g. Kantorowicz-Reznichenko & Kantorowicz, 2021) and

others resembling more of a typical marketing campaign thus having higher filtration (e.g. Maheswaran & Meyers-Levy, 1990). However, the clearest example of general but filtered norm information comes in the form of institutional actions. Organizational culture is signaled in part via symbols or artifacts, practices that can be seen or heard directly which reflect the underlying cultural beliefs (Schein, 1985/2010): a dress code is an institutional signal of the underlying employee beliefs' in formality, just as a hot-desk culture may be a signal of norms that value equality. These artifacts can be both the outcome of social norms – they become instantiated as formal policy as a function of collective approval of the action thus indicating the underlying average behavior or belief – and the antecedent of social norms in that even when the artifact or symbol is instantiated without collective support, it will influence future behavior and thus future perceived norms through the naturalistic fallacy. Such signals thus are both general, in that they communicate information that is relevant to the behavior of the entire reference group, but highly filtered, in that the relationship between the symbol or artifact that an employee perceives and that actual norm information it conveys passes through several layers of distortion.

Institutional signals can also function at the broader, society level. When the US Supreme Court delivers a decision Tankard & Paluck (2017) suggest that individuals view it as an indication of a broader consensus in the population or a projected future consensus of the population, as in the case of the legalization of same-sex marriage. Similarly, the popularity and rise of Donald Trump weakened prescriptive social norms that would previously have sanctioned the expression of xenophobic beliefs in the US (Bursztyn, Egorov, & Fiorin, 2020). However, the effects of institutional signals are not always as clear. After the Supreme Court's decision on *Dobbs vs. Jackson Women's Health Organization*, which decrease abortion access in the US, perceived social norms shifted in the direction of greater rather than lesser support for abortion

access (Clark et al., 2023). This suggests that institutional signals, perhaps because of their degree of filtration, may function more as cues for individuals to check-in with other forms of norm information and see if anything has changed. Individuals might talk to friends or scroll social media to check whether the institutional action reflects collective beliefs of behavior and thus see the signal either confirmed, as in the case of the legalization of same-sex marriage, or rejected, as in the case of abortion rights.

### **2.2.1.5 Weighing Norm Information by Type**

A rational account of information processing would suggest that information should be weighted most heavily when it pertains to a larger portion of the reference group (high generality) and has passed through the fewest layers of distortion (high transparency), because this provides the most reliable information about the greatest number of people (Prentice & Paluck, 2020). Information that applies to fewer individuals (high specificity), especially when it is not witnessed first-hand and thus is vulnerable to distortions (high filtration) should thus be weighted less in one's perception of social norms. Even when it is witnessed first-hand (high transparency), observing the behavior of any one individual (high specificity) only offers an incomplete picture of the overall distribution of behavior and thus should be less informative than information with greater generality (see Figure 2a).

However, research on judgement biases suggests that individuals may give greater weight to specific rather than general information because it is more concrete and vivid. The identifiable victim effect documents individual's tendency to offer more aid to specific rather than general victims (Jenni & Loewenstein, 1997; Small, Loewenstein, & Slovic, 2007). These paradigms often parallel a comparison of specific, transparent, norm information to general, filtered, norm information, but would predict that individuals weigh the specific information

more than the general. Similarly, Loewenstein and colleagues (2001) proposed that individuals use their affective states as a proxy for judging the riskiness of actions, and thus vivid risks (e.g. plane crashes) are judged as riskier than more mundane ones (e.g. car crashes; Lerner et al., 2003) regardless of the true underlying frequencies. This distinction could predict that gossip, which is often vivid and salacious, could influence perceived norms more than equivalently specific, but less filtered, direct observations of social norms to the extent that one more rarely observes behavior as vivid (see Figure 2b).

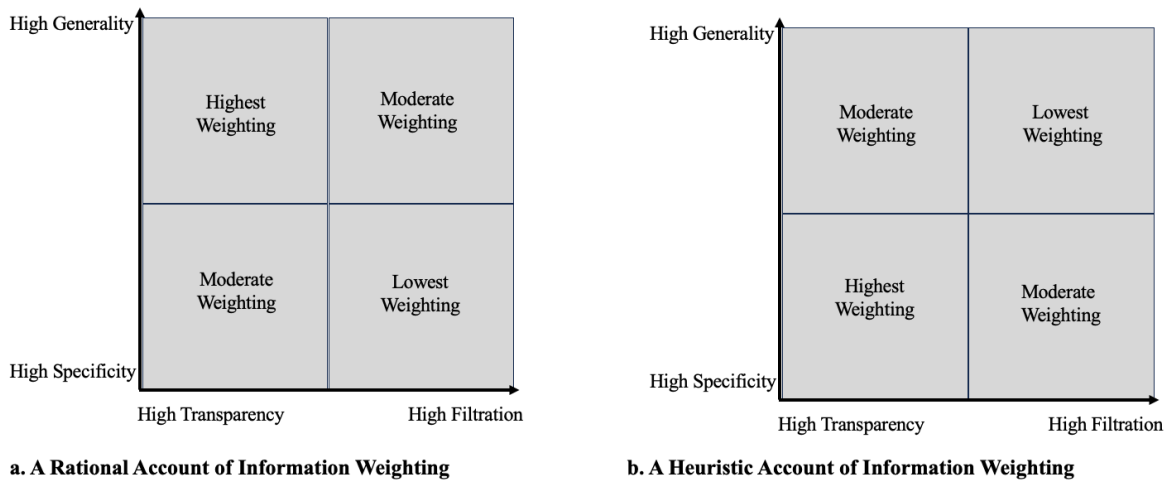


Figure 2. Weighting of norm information by type of information under a rational or heuristic account of norm perception.

### 2.2.2 Interpretating Meta-Norm Information

The different varieties of norm information reviewed above are largely first-order signals, which is to say that they are indications of the actual behavior or beliefs of the reference group, each of which underlies the respective descriptive or prescriptive norm an individual is trying to perceive. In contrast we define meta-norm information as the rewards or punishments one observes levied in response to first-order behavior, in line with the definition of meta-norms as

those norms which govern the appropriateness of punishment for violations of norms (Axelrod, 1986; Bicchieri, 2006).

Meta-norms have most often been studied by political scientists, legal theorists, and economists. Elster (1989) highlights the importance of meta-norms in providing the societal backbone for the punishment of norm violators, thereby reinforcing the observance of primary norms. Moreover, Coleman (1990) elaborates on the role of meta-norms in generating social capital by fostering trust and mutual expectations among community members. This in turn facilitates cooperation and collective action, essential for societal progress and cohesion. Posner and Rasmusen (1999) discuss how meta-norms serve as a deterrent mechanism by escalating the costs associated with norm violations, effectively stabilizing social expectations and behavior over time.

Meta-norm information thus most often takes the form of observing the social punishment of a peer. This can be general or specific and transparent or filtered information, but in all cases meta-norm information could be incorporated into one's perception of the norm differently than first-order information of the same type because meta-norm information signals that a behavior both occurred but was inappropriate. Thus, unlike first order information, which generally involves a positive correspondence between descriptive and prescriptive norm information, meta-norm information explicitly involves a discordance between descriptive and prescriptive norm information. Social learning suggests that peer punishment discourages similar behavior in others (Fehr & Gächter, 2002; Krasnow et al., 2012; Molho et al., 2020; Yamagishi, 1986), which would suggest that meta-norm information is processed similarly to first-order norm information, only in the opposite direction: learning someone does something is a positive weight for that norm, learning that someone was punished for the same thing is a



negative weight for the same norm. Prior research suggests that those with greater metacognition learn new social norms faster when receiving positive and negative reinforcement (Morris, Savani, & Fincher, 2019). However, future research is needed to see how this pattern may vary as a function of the target, punishing actor, and severity of punishment.

### **2.2.3 Access to Norm Information**

All sources of norm information previously described are not equally available to all people, and thus in addition to considering the format of the norm information one receives, it's also important to consider the representativeness of the information to which one has access and, in particular, any distortions that might arrive from systematic differences in access to information. We will consider two primary sources of distortion: social network construction and private or stigmatized behaviors.

Many of the forms of specific norm information previously discussed are accessed via one's social network ties, which are rarely a representative sample of one's broader reference group. Prior research has identified two overarching patterns of distortions in an individuals' network ties. The first is homophily, describing the tendency for individuals to form ties with others of similar attitudes (e.g., Byrne, 1961; Condon and Crano, 1988), traits (e.g., Feiler & Kleinbaum 2015), demographic attributes like gender or race (e.g., Lazarsfeld & Merton 1954) and political ideology (e.g., Boutyline & Willer, 2017). As a result of homophily individuals are likely to perceive social norms as biased in the direction of their own behaviors or attributes (Lee et al., 2019), though individuals sometimes intuit this bias and correct for it in their perceptions of their community (Galesic, Olsson, Rieskamp, 2012, 2018). The second distortion comes from acrophily, a term coined by Goldenberg and colleagues (2023) to describe individuals' desire to connect with those with extreme political beliefs within their own political party. Goldenberg

and colleagues (2023) describe acrophily within the American two-party political system and therefore conceptualize it as a preference for ties with individuals on either end of a bipolar spectrum but their description of acrophily captures a more general directional preference towards ties with extreme others. This is similar in concept to the notion of the friendship paradox as coined by Feld (1991), wherein an individual's friends will on average have more friends than that individual, in that in both cases an underlying attribute, political extremity or friendliness and extraversion, can be over-represented in one's network ties relative to their frequency in the population because the attribute itself attracts ties (Jackson, 2019). This suggests that behaviors that exhibit greater homophily or acrophily may be more likely to generate misperceived social norms as a function of distorted samples of norm information.

In addition to biased perceptions stemming from forces in social network formation, private or stigmatized behaviors may give rise to norm misperceptions because individuals likely only have access to a censored distribution of norm information. When a behavior is stigmatized, such as abortion or miscarriage, Cowan (2014) suggests that selective disclosure may distort perceptions of the behavior's prevalence. A less extreme version of the selective disclosure mechanism may occur if people simply focus their conversation on areas of agreement (Wittenbaum & Stasser, 1996), which could reinforce the previously discussed effects of homophily. Huang & Ho (2024) suggest that these distortions stem in particular from inaccurate attributions for the silence of others: peers self-censor what they believe is socially inappropriate, but individuals interpret this silence instead as evidence that their peers instead support the prevailing norm. Each of these cases can be viewed as a censored environment in that one part of the distribution of underlying norm information is visible while the rest is kept private, leading to biased perceptions of the underlying distribution mean (Feiler, Tong, & Larrick, 2013).

### **2.3 Integrating Norm Information with Starting Expectations**

In Section 2.1, we outlined the starting expectations one holds when entering a novel situation and in Section 2.2 we considered the weighting of norm information one encounters in one's environment. An individual's resulting, final perception of the social norm for a situation is captured by a combination of both one's starting expectations and the norm information one encounters.

Prior research proposes two major categories of belief updating: Bayesian learning and DeGroot learning. If norm perception were Bayesian, one's final perception of the norm would be proportional to one's starting expectation weighted by one's evaluation of the likelihood of observing this set of new norm information given one's new guess of the norm (e.g. Cranefield et al., 2016). Prior work has suggested that a wide variety of cognitive processes can be accurately represented by Bayesian learning, including stereotype acquisition (Bai, Fiske, & Griffiths, 2022), visual perception (Yuille & Kersten, 2006), language learning (Xu & Tenenbaum, 2007), and causal learning (Lu, Yuille, Liljeholm, Cheng, & Holyoak, 2008). Given the similarity of many of these learning processes to our examination of social norm perception, it seems plausible that norm perception could also be represented as a Bayesian learning process. However, these models have often been criticized for the cognitive intensity they require on behalf of individuals. In contrast, DeGroot learning offers a simpler form of aggregation in which individuals simply average their prior information with new information each weighted proportionally to the amount of information (e.g. the proportion of the reference group described) that each represents. Chandrasekhar, Larreguy, & Xandri (2020) suggest that social learning of binary community attributes more closely follows a pattern of DeGroot than Bayesian learning, suggesting that the simpler DeGroot model may be more appropriate for

social norm perception. In principle, our framework for norm perception is agnostic with regards to how individuals weight their starting expectations relative to their summary of the present norm information, but future research might examine this question more closely in order to delineate which model more closely approximates the process of norm perception.

In addition, we have so far assumed that individuals are sufficiently uncertain in their perception of the norm, that they are actively seeking and processing norm information. But prior research would suggest that given a sufficient level of confidence in one's perception of the norm, norm information is only passively consumed (Yoshida et al., 2012). Sociologists often focus specifically on social norms that have been present for long enough that the norm is "taken for granted," sometimes referred to as institutionalization (Zucker, 1977). In such cases one might imagine that even when norm information is readily available individuals disregard it, absent a signal substantial enough to interrupt the assumptions of institutionalization.

### **3. Related Theories, Frameworks and Reviews**

Our theory of social norm perception draws on a long line of prior work examining social learning (Gross & Vostroknutov, 2022; Zhang et al., 2023), social influence (Chung & Rimal, 2016; Knoll et al., 2015; MacCoun, 2012, 2015; Tankard & Paluck, 2016), category perception (Kahneman & Miller, 1986; Kashima et al., 2013), and group perception (Galesic, Olsson, & Rieskamp, 2018; Kashima, Woolcock, & Kashima, 2000). Though an exhaustive review of all possible related frameworks and theories is beyond the scope of this article, we will describe our relation to four papers which we view as most closely relevant.

Galesic, Olsson and Rieskamp (2018) articulate a goal similar to ours in the creation of their Social Sampling Model (SSM). The SSM aims to predict not just how individuals might perceive descriptive social norms, but any sort of perception of a collective attribute (e.g. highest

level of education achieved, belief in a god or supreme being). The key feature of the model lies in its intuition that individuals knowingly adjust away from their own homophilic samples of social information in order to make more accurate judgements of such collective properties. This intuition, in combination with varying degrees of homophily for different attributes or behaviors and varying distributions of different attributes or behaviors allows the SSM to predict both patterns of false consensus as well as false uniqueness. Our theory of social norm perception departs from the SSM in two important ways. First, the SSM makes clear predictions about how individuals judge the descriptive social norm of a behavior, but leaves open the question of how individual's might perceive prescriptive social norms or the relationship between descriptive and prescriptive perceptions generally. Given the importance of prescriptive elements in social norms, a theory of social norm perception necessitates a stance on how descriptive information informs prescriptive social norm perception. Second, all observed behavior in the SSM is considered differentially weighted by the observer only as a function of the degree to which that behavior is similar or different to the observer's and only those behaviors or attributes of one's social sample are considered as information. A theory of social norm perception must build on this foundation, but also consider other sources of norm information (e.g. institutional signals or summary statements) as well as other reasons to discount or emphasize certain behavior in one's weighting of it (e.g. social status or prestige). One can therefore consider the SSM as operating within any theory of social norm perception, and then layer these additional considerations onto the foundation of sampling and weighting that the SSM provides.

In Norm Theory, Kahneman & Miller (1986) develop a theory of the perception of category norms. Category norms differ from social norms in that they pertain to all stimuli

rather than just social groups. For example, a category norm would let one classify items as typical or unusual to be taken on a camping trip (Kahneman & Miller, 1986), while a social norm would be generally irrelevant. Category norms may be social in nature, e.g. “Is this person friendlier than most of your neighbors?” but needn’t require a social norm to be present. Social norms could be considered a subset of category norms in that the category itself is a combination of the reference group for which one is perceiving a social norm and the behavior that the social norm governs. Norm theory suggests that many category norms are constructed post hoc rather than prior to the event. While this appears somewhat in contrast with our three-stage theory, we note that this is in line with our consideration of the weighting of norm information. While an individual may enter a situation with a pre-determined weighting of any information they might encounter, it seems likely that instead these weights are determined post-hoc, with a similar consideration of counterfactuals to that of Norm Theory.

In his Burden of Proof (BOP) model and extensions MacCoun (2012; 2015) considers how to formally model a wide variety of social influence dynamics in a single theory. Two elements of the resulting model relate directly to one’s perception of the social norm as we discuss it. First, the BOP model borrows from Latané’s (1981) social impact theory in its emphasis on social influence as a function of the proportion of individuals in favor of a given action relative to the total size of the group. Greater conformity occurs when a large proportion of people supports an action, as compared to a small proportion. Our consideration of the descriptive social norm operates similarly, but with the additional consideration of how individuals might weight different forms or sources of norm information as a function of its perceived diagnosticity or as a function of cognitive biases and heuristics.

Tankard & Paluck (2016)'s framework for norm perception is perhaps the most closely related to our current model. The authors suggest three primary sources of norm information – group members' behavior, summary information about groups, and institutional actions – and five conditions under which interventions using norm information are most likely to shift behavior – personal identification with the source, high believability of information, information that accords with personal views, signals of a broad base of support, and providing evaluative feedback. These sources of norm information parallel three of the sources we review in this article and several of the conditions parallel reasons we review for why one might give greater weight to a particular piece of information. We consider our model an update and extension of Tankard & Paluck's review, with a particular focus on social norms operating in smaller contexts such as groups or teams.

#### **4. Considering Differences in Norm Perception as a Function of Categories of Norms**

Our consideration of social norm perception has thus far treated all social norms equivalently regardless of the underlying content of the behavior, *A*, involved. This is intuitively unsatisfying. It seems clear that perceiving the social norms for alcohol consumption at a work event must feel different than perceiving the social norms for energy conservation in one's neighborhood. But theories of social influence and social learning are generally agnostic with regards to whether the behavior under consideration is the movement of light (Sherif, 1937), the length of a line (Asch, 1956), the articulation of an opinion (Moscovici, 1961), or any one of the dozens of social norm interventions previously described. This oversimplification is reflection of insufficiency of current theory to allow for meaningful dimensions or categories of social norms.

Prior literature offers relatively sparse categories of comparison for different types of social norms. Miller and Prentice (2016) review social norm interventions and offer two broad categories of norms based on combining those of similar behavioral content: the first capturing interventions to change negative and risky behaviors such as binge drinking (Burchell et al., 2013; Perkins, 2014), drug use (Perkins, 2003), or unprotected sex (Lynch et al. 2004) and the second capturing interventions to change public goods behaviors, particularly environmental behaviors such as energy use (Ferraro & Price, 2013), recycling (Schultz, 1999) or water conservation (Ferraro & Price, 2013).

Similarly, investigations of social norm emergence have often relied on a taxonomy of social norms as they relate to economic games. This approach begins with the understanding that different behaviors and social interactions naturally have different incentives that encourage certain patterns of behavior (Ullmann-Margalit, 1977). Given these incentives social norms are viewed as the collective solution which allows for the greatest social good to be achieved. For example, Ullmann-Margalit (1977) defines Prisoner's Dilemma norms as social norms in which the collective is best off if no one defects but all individuals have an incentive to defect. Prisoner dilemma norms thus emerge to discourage defection. One could see this play out in social norms which govern illicit activity (e.g., refraining from polluting, Haab & McConnell, 2002; tax compliance, Wenzel, 2004; punishing free-riders, Fehr & Gächter, 2000). Alternatively, one could apply prisoner dilemma norms to risky behaviors. Take for example binge drinking on college campuses are studied by social norm interventionists One could view the students who go to a party and binge drink as considering everyone's engaging in binge drinking as the "most fun" social outcome, even though each individual student would privately prefer to "defect" by drinking responsibly. Those students who do defect are thus disparaged in part because their



defection undermines the value others experience from collective participation in a deviant act. This logic is similar to the consideration of public goods norms by Miller & Prentice (2016). In both cases, the collective will receive the most utility if it can align on a specific outcome, regardless of whether this outcome is a more enjoyable party atmosphere or a more hospitable environment due to conservation of resources, but individuals may feel a pull to defect (prisoner's dilemma) or free ride (public goods) because such behavior is more personally rewarding.

We can contrast prisoner dilemmas norms with Ullmann-Margalit's (1977) coordination norms. In cases of coordination norms multiple equilibria might be considered of similar value for the collective and individual incentives are entirely aligned with collective incentives. Research suggests that working from home versus in an office is largely a modern coordination norm: while some employees may have preference for one location versus another, generally all would prefer to work from home if all coworkers work from home but be in the office if all coworkers are in the office (Barrero, Bloom & Davis, 2023; Bloom et al., 2015). As a result of the aligned incentives, coordination norms may not require the same level of sanctions to ensure conformity as prisoner's dilemma or public goods norms.

Finally, separate literature has suggested a distinction between types of social norms as a function of the moralization of the behavior. While some may view moralization as simply a more extreme degree of a prescriptive norm (Dannals & Miller, 2017a), others suggest that moral norms should be considered a difference in kind rather than degree. This perspective is rooted in studies which demonstrate distinctive psychological responses to immoral behavior relative to counternormative behavior, particularly in children (Turiel, 1983) and parallels the distinction

between moralized and non-moralized attitudes (Skitka et al., 2021; Skitka, Wisneski, & Brandt, 2018).

Collectively, each of these approaches validates the concern that heterogeneity across behaviors likely shifts the way in which social norms influence behavior and are perceived by individuals, but no approach offers a comprehensive means of theoretically categorizing or classifying social norms. This is perhaps because such a task seems akin in scope to a theory of situations, the creation of which has generally plagued social psychology since its conception (Eckes, 1995; Edwards & Templeton, 2005; Forgas, 1981; Halevy, Kreps & De Dreu, 2019; Kelley et al., 2003; Mischel & Shoda, 1995; Pervin, 1978; Price, 1974; Reiss, 2008; Seeman, 1997; Sherman, Nave, & Funder, 2010). However, absent such a theory, social norms research is left with a status quo of two dissatisfying extremes: treat every norm as unique or treat every norm as isomorphic. Future research and theory are needed in order to generate categories or dimension that will allow for a both more nuanced and cumulative study of social norms.

## **5. Conclusion**

In this article we have outlined a theory for how individuals arrive at their perception of descriptive and prescriptive norms. Norm perception proceeds in three stages, with individuals beginning with an egocentric and naturalistic perception of the norm, then weighing and summarizing norm information of varying specificity and transparency, and finally integrating starting expectations with the new summary information. Though we have reviewed a variety of work on norm perception, the goal of this article was not to settle the question of how norm perception occurs, but rather to outline one potential process as an inspiration for future research on social norm perception.

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