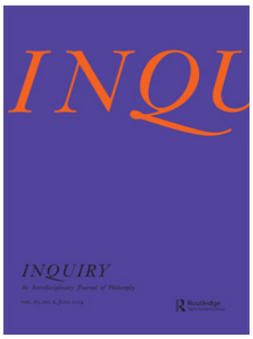

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Clinical reasoning and generics

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ABSTRACT

I argue that generic generalizations expressed in language (i.e. 'generics') are apt for clinical reasoning. I introduce generics and describe two problems in the use and interpretation of generics: Generics may license inaccurate judgements about the frequency of events or properties within a group (i.e. a problem with the 'truth-aptness' of generics) and may facilitate problematic beliefs about social kinds (e.g. prejudice or essentializing). I provide an account of clinical reasoning and describe some features of what I call 'good' clinical reasoning. I offer examples of generics in clinical contexts and examine how the two problems with generics (i.e. of truth-aptness and social generics) can harm patients and impair clinical reasoning. However, I ultimately argue that generics are important for good clinical reasoning because they track 'conspicuous' features of disease processes (e.g. severe possible outcomes). Further, I argue that prejudicial generics are often irrational to believe. Social generics that are rational to believe need not lead to problematic implicatures about social kinds and can instead facilitate meaningfully articulating societal injustices. I then argue that statistical statements, which are tempting alternatives to generics in clinical reasoning, are no better than generics for good clinical reasoning.

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1. Introduction

Generic generalizations expressed in language (hereafter 'generics') include statements like 'planes fly,' 'roses are red,' and 'ticks carry *Borrelia burgdorferi* (Lyme disease).' They express generic generalizations, separating them from explicitly quantified statements (i.e. statements using 'all,' 'some,' 'most,' etc.), which communicate some information about the proportion of referents to which the statement applies. Generics are thought to play a critical role in child cognitive development, including in (social) categorization and in generating inferences about groups

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(see Gelman et al. 2019; Rhodes et al. 2018; and Gelman and Bloom 2007). Moreover, generics present a semantic challenge concerning their truth values. With respect to the above examples, some planes cannot fly, many roses are not red, and only a small percentage of ticks carry *Borrelia*. Yet, all three generic statements seem intuitively true. To make matters worse, it seems that people are willing to accept a novel generic as true with very little evidence for them (e.g. accepting 'Lorches [fictitious kind] have purple feathers' even when only 30% of lorches are presented as having purple feathers), yet are willing to generalize the content of a generic to nearly all members of a kind (e.g. inferring that nearly all lorches have purple feathers after being told, 'Lorches have purple feathers,' see Cimpian, Brandone, and Gelman 2010). This asymmetry in accepting and applying generics has troubling implications for our ability to appropriately endorse and infer from generics. There have subsequently been numerous attempts to characterize generics, provide a theory of what unites them, and understand what makes them true or false (see Sterken 2017 and Leslie and Lerner 2022 for helpful overviews).

Further, generics often convey stereotypes, leading to potentially problematic generalizations about social kinds. For example, generalizations like 'Women are submissive,' 'Black people commit crimes,' and 'Asian people are good at math' represent problematic, possibly essentializing stereotypes about social groups. Accordingly, some have argued that we ought not use generics to describe or discuss certain social kinds (e.g. Haslanger 2011 and Leslie 2017). However, generics may also be used to aptly describe systemic injustices like 'Black people face economic discrimination,' suggesting that wholesale rejection of generics for describing social kinds could preclude productive conversations about oppressive systems (Ritchie 2019).

Thus, there are two problems presently considered with respect to generics: their tendency to license inaccurate judgments about the frequency of events or properties (which I call the 'truth-aptness' problem of generics) and the potential perniciousness of generalizations when applied to social kinds (which I call the 'social generics' problem).

Truth-Aptness Problem: Generics license inaccurate judgments about the frequency of events or properties in a group.

Social Generics Problem: Generics lead to prejudice when used to characterize social kinds.

These problems are critical to examine across numerous domains of reasoning, including ordinary, educational, legal, and medical contexts,

among others. In all of these areas, truth-aptness (i.e. forming accurate judgments) and appropriately representing social categories (and the people within them) are *prima facie* desirable. In this paper, I will primarily consider the role of generics in the medical context, particularly from the perspective of healthcare providers.

I will consider what (good) clinical reasoning is (section 2). Then, I will introduce the roles of and problems with generics in clinical reasoning (section 3) and evaluate whether generics are bad for clinical reasoning in light of the truth-aptness problem (section 4). I argue that generics are particularly apt for good clinical reasoning, even compared to statistical data (that could be employed by machine learning algorithms, for example). I claim that, central to good clinical reasoning, generics are appropriately truth-apt because they track *conspicuous* (perhaps *salient*) features of disease processes, including the severity of unlikely outcomes. Next, I evaluate why I think the social generics problem is not insurmountable (section 5), namely that prejudicial generics are almost always irrational to believe, and even rationally believed social generics are not necessarily tied to prejudicial thinking. I consider statistical statements as alternatives to the use of generics (section 6) and conclude by briefly discussing how this view has implications for medical care, specifically in the advancement of technologies like machine learning in clinical reasoning as well as for medical education and clinical training (section 7).

2. (good) clinical reasoning

Clinical reasoning is often understood as a complex cognitive activity involving contextual and social mediation (Koufidis et al. 2021). It involves structured synthesis of biological, social, pathophysiological, and psychological knowledge (among others) to arrive upon a range of possible diagnoses from a range of data (Higgs et al. 2019). Moreover, the aims of clinical reasoning include identifying both appropriate diagnostic and therapeutic avenues (Gruppen 2017). While there is no universally accepted definition of clinical reasoning, I propose the following definition for at least the purpose of this discussion.

> **Clinical Reasoning:** A process through which signs, symptoms, imaging, laboratory, social, patient history, and/or epidemiological data are synthesized to diagnose, manage, or prognosticate medical problems.

There are a few implications of the definition I have chosen.

First, this relatively bare definition does not distinguish, by itself, between good and bad clinical reasoning. Thus, any process that makes use (broadly construed) of clinically relevant data to arrive upon a diagnosis (even an incorrect one), management strategy (even a bad one), or a prognosis (even an inaccurate one) counts as clinical reasoning. Further, the definition suggests that one need not pursue additional clinically relevant data to be engaged in clinical reasoning. However, if one is not making use of at least one of these kinds of data, one is not engaged in clinical reasoning.

As a consequence, this definition does not exclude artificial intelligence from engaging in clinical reasoning. I therefore submit that there is nothing, in principle, that prevents machine learning algorithms from performing clinical reasoning, provided that these algorithms are provided with the right kinds of data. Neither is the layperson excluded from participation in clinical reasoning. Further, reasoning about case studies (even retrospectively) also counts as clinical reasoning, so long as one is synthesizing clinical data to form a diagnosis, identify management options, or develop a prognosis (whether this reasoning is eventually applied to a real patient or not).

This definition is thus inclusive of a range of clinical activities, including psychiatric diagnosis, interpretation of radiologic images, or managing the symptoms of an illness without knowing the underlying cause of the symptoms. Again, one need neither arrive upon the correct diagnosis nor manage the medical problem effectively nor prognosticate accurately in order have engaged in clinical reasoning: It is enough for the reasoning to be directed toward diagnosis, management, or prognosis.

However, clinical reasoning that yields correct diagnoses, effective management, and accurate prognoses of medical problems is, of course, *better* than clinical reasoning that does not.

For humans at least, good clinical reasoning requires, in addition to knowledge of the relevant organ and social systems, critical reflection on one's methods for seeking information, potential cognitive biases, and application of standardized scales of assessment (Benner, Hughes, and Sutphen 2008). Intuitively, there are other features of good clinical reasoning that arise across procedural and outcome-focused considerations.

For example, good clinical reasoning is not the product of luck. A diagnosis of a heart attack from a laboratory troponin level reflects better clinical reasoning than a coin flip after seeing a patient clutching their chest. In other words, good clinical reasoning involves strong epistemic reasons

for the diagnoses and management plans arrived upon. Whether these reasons include evidence-based guidelines or reliance on expert testimony, someone engaged in good clinical reasoning should have strong, reliable, epistemic reasons for whichever diagnoses or therapeutics they endorse.

Moreover, good clinical reasoning involves the generation of a *differential diagnosis*. Broadly, differential diagnosis is a process by which competing possibilities for describing a set of signs, symptoms, imaging data, etc., are produced and adjudicated to arrive upon an accurate diagnosis (Cook and Décary 2020).

Differential diagnosis is not only desirable for including the correct diagnosis in the range of considerations (e.g. a diagnosis which explains the clinically relevant data, a diagnosis which is likely given the available data, etc.), but also for monitoring error possibilities and tracking potentially dangerous conditions. For example, suppose that a patient mentions having a sore throat and a cough. High on the differential (i.e. most likely diagnoses) are relatively benign viral infections. Low on the differential (but still on the differential) are rarer diseases like laryngeal cancer.

Good clinical reasoning through differential diagnosis can thus be thought of as a process in which relevant data (i.e. signs, symptoms, imaging, laboratory, etc.) are used as evidence for or against diagnostic possibilities. That is, clinically relevant data can be used to support a (new) diagnostic possibility or to render unlikely (or remove) an existing diagnostic possibility. Each given clinical datum either supports a diagnostic possibility or stands in need of an explanation by a diagnostic possibility.

Another benefit of differential diagnosis is that it encourages the acquisition of additional data to help rule out rare, severe conditions (e.g. 'How long have you had this sore throat for?'). Although rare presentations of common diseases occur more frequently than common presentations of rare diseases, the potential severity of rare diseases often warrants at least minimal efforts (e.g. perhaps asking an additional question in a patient interview, rather than performing an endoscopic procedure) to further distinguish which diagnostic possibility is most likely.

Even when clinical reasoning is not targeted at achieving a diagnosis (i.e. when primarily prognostication or medical management is the goal), differential diagnosis is still a part of good clinical reasoning. Some working theory (however minimal) of the underlying disease process is helpful for accurate prognostication and effective management

of medical problems. For example, an oncologist predicting the course of a patient's cancer will be much more likely to provide an accurate prognosis if she is right about which kind(s) of cancer the patient might have. A cardiologist aiming to treat a patient's low potassium will be more successful at treating the low potassium (particularly in the long term) if she understands some reasons as to why the patient has low potassium in the first place (e.g. kidney injury, dietary lack).

There are doubtless other features of good clinical reasoning. For one, good clinical reasoning targeted at managing a medical problem likely involves prudent therapeutic selection to minimize adverse events and interactions, regard for cost of treatments, awareness of off-label or secondary uses for medications (particularly when these uses cover other possibilities in the differential), etc. However, it is enough for now to have provided a brief characterization of clinical reasoning and to have identified a few features that make for good clinical reasoning.

In the next section, I will consider how generics arise in clinical reasoning and describe how the two problems with generics can contribute to problems in clinical reasoning.

3. Generics in clinical reasoning

Generics appear in numerous kinds of clinical statements. The types of data utilized in clinical reasoning (signs, symptoms, imaging, laboratory, social, patient history, epidemiological) all possess readily-available examples, listed below.

(1) Sign: 'The obturator sign indicates appendicitis'
(2) Symptoms: 'Fevers suggest infection'
(3) Imaging: 'Computed tomography (CT) scans detect early subarachnoid hemorrhage'
(4) Laboratory: 'Elevated creatinine indicates kidney damage'
(5) Social: 'Gay men contract human immunodeficiency virus (HIV)'
(6) Patient History: 'Smokers develop lung cancer'
(7) Epidemiological: 'Chagas disease comes from Latin America'

None of these generics is entirely unproblematic, though some are more problematic than others. The obturator sign is estimated to have a low sensitivity (8%) and a relatively high specificity (94%) for appendicitis (Rastogi et al. 2018). Fever over 37.5°C (99.5°F) has a low sensitivity (12.6%) though a high specificity (97.8%) for infection in patients aged

18–64 (Small and Clements 2014). CT scans detect subarachnoid hemorrhage with a 98.7% sensitivity and 99.9% sensitivity within six hours of symptom onset (Dubosh et al. 2016). Serum creatinine above 1.7 mg/dL is relatively insensitive (12.6%) and highly specific (99.9%) for renal failure (Swedko et al. 2003). The clinical generics (1-4) provide general indicators for underlying pathologies, though they are (of course) not certain methods for detecting their corresponding pathologies. Thus, there may be some question as to the truth-aptness of the generics (1-4).

Generics (5-7) present additional challenges in their interpretation. In the United States, five out of six men who have sex with men (MSM) do not contract HIV, though an estimated 66% of people infected with HIV in 2021 were MSM (Centers for Disease Control and Prevention 2018 and Centers for Disease Control and Prevention 2023). Thus, the generic 'Gay men contract HIV' is problematic with respect to its truth-aptness (i.e. the majority of gay men do not contract HIV). Furthermore, the generic 'Gay men contract HIV' risks eliding biological, historical, and social understandings of the increased prevalence of HIV in MSM. That is, the generic 'Gay men contract HIV' provides, in itself, no explanatory mechanism for its content. It was, accordingly, common for interpreters to suppose that MSM 'deserved' their illness on account of supposed carelessness, punishments from God, and other explanations motivated by the stigma associated with homosexuality (see Herek and Glunt 1988 and Herek and Capitanio 1993). However, it been since shown that MSM actually utilize barrier methods like condoms more frequently than heterosexual partners (Glick et al. 2012) and proposed that the relative dearth of protective epithelial lining in the rectum (contributing to increased bleeding during anal intercourse) – paired with the increased presence of lymphocytes in the gastrointestinal tract – at least partially explains the higher rate of HIV transmission among MSM. Nonetheless, the generalization that gay men contract HIV risks enabling the misrepresentation of members within a social category when the regularity expressed by the generic is attributed to prejudiced explanations.

Studies have estimated that 80-90% of lifelong smokers never develop lung cancer, though an estimated 87.5% of patients with lung cancer were found to be current or former smokers (see Crispo et al. 2004; Villeneuve and Mao 1994; and Siegel et al. 2021). At best, the generic, 'Smokers develop lung cancer' is ambiguous: whether the generic is describing the prevalence of lung cancer among smokers or the prevalence of smoking among those with lung cancer could determine the

truth-aptness of the generic (inapt in the former, at least somewhat apt in the latter). Smokers, as a social category, could be affected by the generic 'Smokers develop lung cancer' insofar as the generic leaves unexplained the reason why smokers smoke. That is, if generics like this one engender negative stereotypes about smokers (e.g. that smokers are oblivious to health risks, that smokers are helpless, etc.), the use of generics about smokers could contribute to (self-)stigma against smokers that contribute to difficulty in smoking cessation (Evans-Polce et al. 2015).

Finally, generic (7) expresses that Chagas disease is from Latin America. While the triatomine bug (also known as the 'kissing bug') that carries the parasite *Trypanosoma cruzi* (which causes Chagas disease) is mostly found in Latin America, Chagas disease can also be contracted from infected food, a mode of transmission becoming increasingly recognized in recent years (Pereira et al. 2009). Thus, one can plausibly contract Chagas disease while not in Latin America. Of course, this possibility is not excluded from the construction of generic (7), but it is not particularly highlighted either. We would want someone engaged in good clinical reasoning to be aware of both possibilities.

I have shown that generics are imperfect with respect to their truth-aptness in clinical reasoning; Generics in clinical reasoning need neither be sensitive nor specific in order to seem intuitively true (though clinical generics are often either sensitive or specific). In addition, bare generics provide no mechanism for the regularities they describe (e.g. exactly why and which gay men contract HIV), leading to the **Truth-Aptness Problem**, over and above concerns of sensitivity and specificity.

Further, generics can lead to problems in describing social kinds. Call generics referring to particular groups of people (e.g. ethnicities, genders, sexual orientations, classes, disability statuses, etc.) *social generics*. Social generics are problematic when they lead to essentialism and/or prejudice about their corresponding kinds. Consider again generic (5), 'Gay men contract HIV.' In essentialist interpretations of the generic, interpreters infer that contracting HIV is an intrinsic property of gay men. In other words, essentializing interpreters believe that it is a part of the nature of gay men to contract HIV (e.g. perhaps through a kind of *by nature* carelessness, divine punishment, etc.), rather than a tendency brought about by incidental or changeable social circumstances (e.g. incidence of bleeding in anal intercourse, lack of early research efforts for decreasing transmission of HIV, etc.).

Worries about essentialization and social generics are not remote. Evidence suggests that children are more likely to recall generalizations

about kinds than recall information about individuals (Cimpian and Erickson 2012). Further, social generics can lead children and adults to infer properties about individuals within a group (Rhodes, Leslie, and Tworek 2012). For example, if a child is told, 'Xs are good listeners. Sarah is an X,' the child would infer that Sarah is a good listener. The child might think, then, that being a good listener is an essential property of Xs, attributing the quality a stable, inherent quality of Xs.

In the clinical examples provided earlier, we have seen how these inferences can be misleading with respect to truth-aptness. Additionally, essentializing through social generics in clinical reasoning can lead to prejudicial beliefs about social kinds, as in the example of gay men contracting HIV. These worries are all encapsulated in what I have called the **Social Generics Problem**.

Given the two problems with using generics in clinical reasoning (i.e. the **Truth-Aptness Problem** and the **Social Generics Problem**), it is tempting to think that generics cannot be a part of good clinical reasoning. In the next two sections, I will argue that the problems of truth-aptness and social generics need not pose obstacles for good clinical reasoning. Rather, I think that generics are apt good clinical reasoning. I will first take on the **Truth-Aptness Problem**.

4. The truth-aptness problem

First, recall the formulation of the **Truth-Aptness Problem**: Generics tend to license inaccurate judgments about the frequency of properties or events in a group or kind.

Next, I briefly consider the matter of false generics. Consider a clinician who believes the generic 'Women exaggerate their pain.' Surely, accepting a generic like this one will lead to bad clinical reasoning in that the clinician will dismiss symptoms of an illness, in this case women's pain.

However, I will not consider generics like these for the **Truth-Aptness Problem** since these sorts of generics are plainly false. That is, evaluating what is defective about a plainly false generic does not help us understand whether intuitively true generics are sufficiently truth-apt for clinical reasoning (an important question because, as we have seen, many intuitively true generics are not truth-apt). Put another away, the problem with 'Women exaggerate their pain' is the same problem with, '80% of women exaggerate their pain.' What is problematic is not the structure of either statement (i.e. as a generic or a statistical statement) but the content: each one is simply false.

I take it that this matter is not settled here. After all, there is the question as *to whom* the generic seems intuitively true. Perhaps a sexist clinician would find the generic 'Women exaggerate their pain' intuitively true. This worry might tempt us to abandon generics altogether, since the truth conditions for a generic are unclear (possibly rendering a generic like this one acceptable in certain conditions). In order to advance the present discussion of the problems of truth-aptness in generics, I will not engage deeply with this problem here. In the next section, once I have discussed one way to understand what makes a generic intuitively true, I will revisit this problem with respect to social generics and the prejudice they can represent or engender.

To approach the truth-aptness problem, it will help to consider a view of what generics are and what makes them intuitively true (when they are). Leslie (2007) argues that generics serve as articulations of the cognitively fundamental process of generalization, which depends on features of categories that are characteristic or striking, often in distinguishing kinds. Though she eventually develops an account of truth conditions for generics, I will not engage with this aspect of her work here (see Leslie 2008). Rather, I will discuss the aspects of Leslie's view focused on what makes generics *acceptable* or *intuitively true* (terms I will use interchangeably) from the cognitively fundamental point of view.

For example, 'Sharks attack surfers' is intuitively true even though very few sharks actually attack surfers. Leslie explains this intuitive truthfulness of the generic by appeal to the strikingness of the generic's content. Strikingness, in Leslie's view, is not the only feature that can be represented by a generic. Properties that a majority of members share (e.g. 'Tigers have stripes') or are considered characteristic of members, even if a majority of members do not share that property (e.g. 'Ducks lay eggs'), can be represented by an intuitively true generic. Generics, thus, point to properties that help distinguish or characterize kinds. In other words, generics are linguistic expressions of psychologically fundamental mechanisms for categorization. I will call the features that generics pick out, broadly, as *conspicuous*.

On this score, I argue that generics are rather well-suited for good clinical reasoning, and that this feature of generics assuages the problem of their truth-(in)aptness.

Consider chronic kidney disease (CKD), which is thought to often be caused by diabetes mellitus – around 1/3 of diabetes patients will develop CKD (Gheith et al. 2015). The generic, 'Diabetes leads to CKD' is an intuitively true generic even though 2/3 of patients with diabetes

will not develop CKD. How can this generic, which fails to apply to the majority of diabetes patients, lead to good clinical reasoning?

The key here is that truth-aptness is not the primary goal of good clinical reasoning. Rather, it is the construction of a relatively broad differential diagnosis that picks out, in addition to statistically likely disease progressions, pernicious disease progressions. Given that CKD is a harmful outcome of diabetes mellitus, indeed a *conspicuous* one (i.e. one that is striking because it is dangerous, like shark attacks), it should be picked out as a serious possibility in good clinical reasoning. That is, generics in clinical reasoning naturally favor prudence, drawing the clinician's attention to potentially harmful outcomes that are best averted or at least anticipated, even if such outcomes are unlikely.

Generics, then, are uniquely suited for good clinical reasoning. Even if the smoker has an 80-90% chance of never developing lung cancer, the good clinical reasoner should be primed to include lung cancer in the differential diagnosis (even if this possibility is subsequently ruled out) because the detriment to the patient is substantial if the possibility is ignored or (for any reason) simply does not come to mind. That is, when engaging in the stage of clinical reasoning centered around including diagnostic possibilities in the differential, generics are uniquely apt for ensuring that pernicious disease progressions are considered. Even if the pernicious diagnosis is not ultimately the correct one, it is prudent for the good clinical reasoner to include the possibility, just as it is prudent for the good clinical reasoner to subsequently rule it out should disconfirming evidence be found. Note that the inverse of this principle does not quite hold true: Ruling in the most statistically likely diagnostic possibilities (e.g. the top 20 most likely diseases) is not likely to lead to good clinical reasoning because rare (but dangerous) diseases will usually not be considered. Thus, while only a tiny fraction of sore throats will be due to cancer rather than a resolvable viral infection, a system for clinical reasoning that does not integrate the strikingness properties (like generics do) will risk failing to detect dangerous outcomes.

Note also that this view does not necessarily entail a kind of pragmatic encroachment about clinical reasoning. The clinician need not believe that the smoker is any more than 10-20% likely to develop lung cancer (i.e. more than the statistics suggest) in order to justifiably include lung cancer in the differential diagnosis for a given patient. Rather, the potential harms of even an unlikely diagnosis could help determine its suitability for inclusion in the differential diagnosis. Of course, the problem of truth-aptness in generics just is that speakers/interpreters tend to

overestimate or underestimate the frequency of properties or events when presented with a generic. But this property of generics, so my argument goes, should not deter us from the use of generics in clinical reasoning, since these generics track (among other things) potentially dangerous disease progressions, even if they are unlikely.

I retrace the claim here. Generics (in clinical reasoning) track conspicuous features of diseases and their progressions (e.g. majority, characteristic, strikingness, perniciousness). Good clinical reasoning involves constructing a differential diagnosis based not only on the statistical likelihood of certain diseases occurring in the patient based on available clinical data, but on the anticipation and consideration of harmful or severe outcomes, even when their odds of obtaining are relatively remote. In this way, generics track exactly what we are hoping to get from good clinical reasoning. Generics can pick out clinical relationships that occur in the majority of cases (e.g. 'CT scans detect early subarachnoid hemorrhage') and also those that are relatively uncommon but still ought to be considered given the downside of failing to consider these diseases when they are, in fact, present (e.g. 'Alcohol consumption leads to pancreatitis').

So, on the first of the two problems of generics considered, that of truth-aptness, generics nevertheless convey the sorts of information involved in good clinical reasoning. Moreover, generics represent cognitively fundamental methods for categorizing kinds based on their conspicuousness, which could depend on the frequency or severity of (in this case) a given pathological process. In this view, generics are a natural way to, through language, attend to conspicuous diagnostic possibilities while developing a differential diagnosis. Thus, even though generics may not always license accurate judgments about the frequency of some disease progression, we should not be so bothered by this problem of truth-aptness, since it is ultimately prudent differential diagnosis that we are interested in, which involves considering the possibility of severe outcomes even if they are infrequent.

5. The social generics problem(s)

Next, I consider the second problem of generics in clinical reasoning. Recall the **Social Generics Problem**, which states that generics license prejudice or essentialization of social kinds, or at the very least enable problematic judgments about members of social groups. Perhaps, then, we ought not use (social) generics in clinical reasoning to avoid these problematic judgments.

In order to address the problems of social generics in clinical reasoning, it will be helpful to grasp precisely what the problems are. I now clarify what I take to be the two types of problems with social generics for clinical reasoning. The first arises when a clinician, even when *prima facie* reasonably, accepts a problematic social generic whose projection to individuals within the target group is harmful and facilitates prejudicial treatment. The second arises when an intuitively true (or perhaps even true) generic is silent as to what explains the regularity expressed by the generic, allowing the clinician to erroneously attribute the regularity to prejudiced explanations.

One last preliminary is in order. Often, the problem associated with social generics is that of *essentialism*. That is, social generics are thought to point to an underlying 'true nature' that can be thought to engender a modal stability, fixing properties or characteristics of a social kind and its members. The 'essence' of something is mysterious, or at least ineffable – it is not the sort of thing directly perceived by the senses (if it exists at all). I thus propose, at least for this discussion, an emphasis on *prejudice* rather than essentialism. Since generics do not always have a clear tie to essentializing rather than mere generalizing (see Hoicka et al. 2021) and *anti*-essentialist beliefs are sometimes associated with prejudice (see Haslam, Rothschild, and Ernst 2002), I submit that worries about prejudice are more relevant, direct, and accessible than worries about essentialism, at least while considering clinical reasoning. I take prejudice to mean a disposition to attribute *negative* characteristics to a member of a social group, in virtue of that member's belonging to that group. What makes these characteristics negative is (among other things) made manifest in the sorts of mistreatment that the attribution licenses.

I think that it is efficient, if not attractive, to discuss prejudice rather than essentialism in speakers engaged in clinical reasoning. For one, we have better intuitions for deciding when one has a prejudicial attitude than for deciding when someone is essentializing (rather than merely generalizing). That is, we may struggle to 'point to' essentializing behavior, but we can more readily point to prejudice because we can see or anticipate its effects in (rationalizations of) mistreatment. Further, I suspect that it is those negative characteristics inferred or permitted by the use of social generics that are the objects of most concern when considering generics in clinical reasoning.

We are now ready to tackle the two problems of social generics for clinical reasoning.

5.1. Intuitively true to whom?

Recall that for the **Truth-Aptness Problem,** I suggested that intuitively false generics should be discarded; the problem with false generics, I claimed, is not in that they're generics, but in that they're false. So, a generic like 'Women lie about pain' should be discarded for the same reason a statistic like '80% of women lie about pain' should be discarded: because it is false. I noted that this simplistic picture of true and false generics did not settle the matter – here, I introduce an additional tool to help us evaluate generics: rationality and irrationality. In short, I will attempt to show that some generics are irrational to believe (e.g. most prejudicial generics), and that we should disapprove of such generics because they are irrational to believe, rather than because they are generics.

A wholesale rejection of generics is too quick because some generics are irrational to hold and would still be irrational to hold even in their quantified or statistical forms (e.g. 'All bachelors are married,' 'some bachelors are married,' 'at least one bachelor is married,' and '1% of bachelors are married' are all false). When evaluating if generics should be rejected for clinical reasoning, we need to evaluate the good ones (i.e. the ones that are rational to believe). Just as it would be a mistake to do away with statistics in general because some statistics are bad (e.g. they are based on small samples), it would be a mistake to do away with generics in general because some generics are bad (i.e. false or irrational to believe). Like statistics, we should figure out what makes generics rational to believe (when they are) and evaluate *those* generics when deciding if they are apt for our purposes. If it turns out that even rational generics are bad for clinical reasoning, then we can confidently throw out the bathwater, assured that there is no baby with it. This argument is similar to how I suggested that false generics should be discarded because of their falsity, rather than because of their genericity. To illustrate this point, we must discuss constraints on rational beliefs.

Since generics are often sincerely held, used in reasoning, and action-guiding (i.e. those who hold them are disposed to act in accordance with them), we should think of generics as contents of at least some beliefs. Someone committed to the opposing claim (i.e. that one cannot believe a generic) would be committed to denying that one can believe statements like 'roses are red.' So, if generics are believed, what makes a generic rational or irrational to believe? Leslie's (2007) view seems like a good place to start. If the believed generic does *not* track what I have called *conspicuous* properties of kinds (i.e. majority, characteristic, and

strikingness), the generic might count as irrational to believe.[1] Hereafter, I will use the terms *accepting* a generic and *believing* a generic interchangeably, though these terms are not quite the same (Cohen 1989).

With that in mind, consider the following hypothetical case, which I intend to help elucidate rational constraints on generic acceptance. The case is contrived, but for a reason: I will attempt to show that even in a case where accepting a prejudicial generic may seem somewhat reasonable, it is still irrational to accept the generic on grounds of procedural irrationality. A prejudicial generic will only be rationally acceptable to someone who has a broader prejudicial belief (which is very likely false). Thus, someone who accepts a prejudicial generic either does so in a procedurally irrational way (i.e. the believed generic conflicts with a broader, likely true belief they have) or in a way that coheres with a broader, likely false, prejudicial belief (i.e. it requires the agent to hold a likely false belief for consistency). Thus, prejudicial generics are likely always irrational to accept (caveats examined in sub-section *5.2.*), and just as we ought to discard clearly false generics on the basis that they are false (rather than because they are generics), we should discard irrationally believed generics on the basis that they are irrational (rather than because they are generics).

Suppose a doctor works at a relatively small community health clinic that has incidentally only received blond-haired patients so far. One day, the doctor meets a brunette patient (his first ever brunette patient) who comes in with pain in the right upper quadrant of her abdomen. He asks his new patient to rate her pain on a scale from one to ten, with ten being the most intense. The patient rates her pain ten out of ten, and the doctor begins his examination.

The doctor finds that the patient has a gallstone blocking the cystic duct and schedules her for a surgery. The patient then makes an odd confession to her doctor.

'I exaggerated my pain. It was more like an eight out of ten,' she says.

[1]While it may appear as though we are making a leap from descriptive to prescriptive claims about generics (recall that I have been engaging with Leslie's account as a psychological, rather than semantic, theory of generics), I do not think we should be troubled. Since generics are often the contents of beliefs, we should think that believed generics are subject to norms of rationality, including those that constrain rational beliefs. And, since believed generics are subject to norms of rationality, their content is fair game for rational evaluation. I take Leslie to be describing what makes for acceptable generics (i.e., they represent conspicuous properties). That is, I don't think 'dogs are two-legged' is an acceptable generic – it is, however, still a generalization: just a bad one (and probably a false one). We are not committing, I think, a categorical error in making this step toward rational evaluation of believed generics.

Suppose that no other patient has ever made a similar confession to the doctor. That is, not a single blond-haired patient of his has ever said that they have exaggerated their pain.

The next day, a nearly identical case occurs. A brunette patient with right upper quadrant pain replies that she has a ten out of ten pain, only to soon after say that the pain was actually an eight out of ten. Suppose that the pattern repeats itself for a few days.

Would the generic 'Brunette patients exaggerate their pain' be acceptable, or intuitively true, to the doctor?

Let's evaluate the generic by the conspicuous features introduced earlier. It would seem that the majority of brunette patients the doctor has seen (100% of them) have exaggerated their pain. Further, exaggerating pain appears to be a characteristic that distinguishes brunette patients from blond-haired patients. Finally, the finding is probably at least somewhat striking – for brunette patients to both be unique as relatively infrequent patients and also in exaggerating pain is unexpected. It would seem that 'Brunette patients exaggerate their pain' has all the makings of an acceptable generic, at least for the doctor.

Of course, a generic like this one seems absurd to accept. For the doctor as well, I think that acceptance of this generic is irrational even though it appears to fit the three conspicuous qualities that generics pick out. But this conclusion is difficult to articulate only in terms of the acceptability conditions of generics we have discussed so far.

What is defective about accepting this generic, I suggest, can be uncovered by appeal to what is often called the *procedural* rationality of belief (see Bortolotti 2009 and Dennett 1979). Someone who is procedurally irrational goes about forming beliefs in a deficient manner. Consider, for example, someone who flips a coin or uses a random number generator to determine all of their beliefs. Even though this person might hold some true beliefs, these beliefs are nevertheless attained irrationally because their procedure for developing beliefs is deficient. Another way to be procedurally irrational is to form inconsistent beliefs. For example, believing that all dogs have brown fur, believing that Fido is a dog, but believing that Fido has black fur, is procedurally irrational (even in a world where all dogs do, in fact, have brown fur). What makes the triad procedurally irrational is in its inconsistency – one cannot form the third without creating tension with the other two. Moreover, the beliefs need not be occurrent to trigger the inconsistency. Whether the beliefs are occurrent or dispositional, forming inconsistent beliefs is procedurally irrational.

How generics can be inconsistent with ordinary beliefs, however, is more difficult to see. For example, the believed generic 'tigers are striped' is consistent with the belief 'this [rare albino] tiger is not striped.' So long as the believed generic fulfills one of the conspicuous features, I suggest that there is no real inconsistency with particular beliefs in these straightforward cases.[2]

However, generics *can* conflict with some ordinary beliefs. For example, the believed generic 'brunettes exaggerate their pain' is inconsistent with the belief 'hair color has no relationship to exaggerating pain.' This inconsistency, I suggest, illustrates the procedural irrationality of the example above.

Of course, there are other reasons why the doctor's acceptance of the generic is at least procedurally suspicious, if not procedurally irrational. He has only learned that *his* brunette patients *claim to* exaggerate pain (which could for example, however unlikely, actually be some coordinated effort by the doctor's patients to prank him). But if we accept, for the sake of the argument, that these factors do not by themselves make for procedural irrationality, the believed generic's inconsistency with the common sense (and likely true) belief that hair color has no relationship to exaggerating pain reveals the irrationality of believing the generic.

Suppose, by contrast, that the doctor has no such belief that hair color has no relationship to exaggerating pain. Perhaps he believes the opposite: He believes that hair color *does* have a relationship to exaggerating pain (and perhaps he holds this belief because of his recent clinic experiences). Thus, there is not the same charge of procedural irrationality as before. Nonetheless, the consistency between the believed generic and the broader belief *requires* that the doctor hold a likely false belief that hair color has a relationship to exaggerating pain. That is, to escape the charge of procedural irrationality, one most accept a (likely) false belief. Moreover, this underlying belief would usually be an extremely odd one (e.g. that race, gender, hair color, etc., affect the likelihood of dishonesty in clinical settings). If the broader belief really is false, then the believed generic is also false (since the latter implies the former). If the

[2]I think that this lack of inconsistency holds even for characteristic and strikingness generics, even though they may appear initially grating. Consider the believed generic 'sharks attack humans' and the belief 'most sharks do not attack humans.' I think the presentation of these beliefs go a long way in demonstrating the lack of inconsistency. Consider 'Sharks *do* attack humans, *but* most sharks do not attack humans.' Or clunkier but more illustrative, '[A striking feature of sharks is that] sharks attack humans, *though* most sharks do not attack humans.'

broader belief is actually true, then a different problem emerges (which will be discussed in subsection *5.2*.).

Consider a third possibility. Perhaps the doctor has no belief at all as to whether hair color has a relationship to exaggerating pain. In this case, there is no inconsistency between the believed generic and the ordinary belief since the doctor has no such belief on the market for the inconsistency. The doctor, in this case, would be violating a version of the closure principle under entailment (see Luper 2020 and Hawthorne 2005). While the closure principle is sometimes controversial, and a full defense of the principle falls beyond the scope of this discussion (though see Pritchard 2022), I give a brief overview of the principle here. One version of the closure principle for knowledge might hold that (1) if *S* knows *p* and (2) *p* entails *q*, then (3) *S* knows *q*. Another way to describe this principle is to say that if (1) and (2) obtain for some agent *S* but (3) does not hold, then *S* is violating a norm of rationality: a diachronic *modus ponens*. Again, a full discussion of the closure principle is beyond the scope of this discussion, but I briefly suggest that the doctor violates a closure principle for rational belief if he believes 'brunettes exaggerate their pain' but fails to believe 'hair color has a relationship to exaggerating pain' (since the former implies the latter). Lastly, I re-emphasize that the beliefs here need not be occurrent, but may be dispositional (or perhaps a disposition to believe, see Audi 1994), to trigger the three problems discussed here.

Thus, the acceptance of a prejudicial generic is almost always irrational. Either the prejudicial generic conflicts with another belief, the prejudicial generic requires a (likely) false, broader, prejudicial belief to engender consistency, or the agent violates the closure principle. In the next subsection, I will consider what happens if the broader, seemingly prejudicial belief turns out to be true. That is, if the doctor comes to believe 'hair color has a relationship to exaggerating pain' and the belief turns out to be true, the generic 'brunettes exaggerate their pain' appears to be both intuitively true (to the doctor) and is at no pains of procedural or structural rationality. These intuitively true (yet still potentially problematic) generics will be discussed alongside other generics like them (e.g. 'Gay men contract HIV').

It is worth nothing that in ordinary cases, prejudicial generics are accepted for worse reasons than the ones detailed in the contrived case. That is, rather than receiving some confession about exaggerated pain, people with prejudicial beliefs tend to form them on a weak epistemic basis. They might uncritically accept them from those around them,

make unlicensed inferences (e.g. 'This Native American person is faking their pain [despite not saying so], therefore Native American people fake pain'), etc. So, in ordinary cases, I think the worrisome generics that we might fear clinicians accept are plainly false: They would be just as false if expressed as their corresponding quantified or statistical statements. But even those generics that may seem not so plainly false (e.g. the rural clinic doctor's belief about brunettes) are still almost always irrational to believe.

When these generics are *not* (procedurally) irrational, that is, when they are consistent with a true (perhaps prejudicial) belief, more must be said. These cases are examined next.

5.2. Silent but deadly? Implicatures of generics

Reconsider the generic 'gay men contract HIV.' Of the people who contract HIV, MSM (a term I will use interchangeably with 'gay men' for the purpose of this discussion) are indeed the most common group. However, the generic is silent with respect to many other socially relevant factors. For example, what do interpreters of 'gay men contract HIV' infer as the reason why gay men, rather than members of other social groups, tend to contract HIV?

Haslanger (2011) discusses this problem in depth, relying on the distinction between semantics and implicature (also known as 'pragmatics'). Semantics encompass what is literally encoded by the meanings of words used in a statement, whereas implicature conveys meaning beyond semantics. For example, if you were to ask me about a new classmate and I responded, 'He hasn't killed me,' I would be conveying (in the sentence's semantics) literally that my classmate has not killed me, but I would also be implying that I perceive my classmate as possibly aggressive or cold, implying that our relationship is not a very friendly one, or implying that my expectations for a good relationship with him are not very high.

Haslanger worries that certain generics (including many social generics) carry unfriendly implicatures. Consider (her example) the generic 'women are submissive.' The generic might well be true, but it may imply that women are *by nature* submissive, rather than submissive as a consequence of patriarchal structures. Consider (my example) the generic 'gay men contract HIV.' Haslanger's worry applied to this generic would be that it may imply that gay people are *by nature* the type of people who contract HIV (e.g. from carelessness, divine curse, etc.).

Two points are relevant to Haslanger's worry.

First, note that the problem would not at all be resolved if statistical statements were used instead of generics. The statement '70% of women are submissive,' *even if true*, suffers from the same problem of troubling implicature. A statement like '52% of American homicide convictions are of Black people, despite Black people constituting 13% of the population,' *even if true* (see Cooper and Smith 2011) suffers from the same problem. The bare generic, along with the bare statistic, can imply that the regularity is owed to some essential property that leads to prejudicial beliefs in speakers or interpreters. So, even if Haslanger is right that the prejudicial implicatures should motivate us to abandon certain statements, this worry should motivate us to abandon generics and statistical statements alike.

However, I don't think that this move is the right one. Consider the generic, 'Slaves cannot make their own decisions.' The semantic content of this sentence is simply that enslaved people are not capable of making decisions for themselves. But what is the implicature?

Perhaps in a society that condones slavery, the implicature is understood to be something like what Haslanger worries: enslaved people, *by their nature*, cannot make their own decisions. Such narratives (i.e. that there are 'natural slaves') have been used in support of slavery (see Ambler 1987 for an Aristotilean discussion). However, in a society that openly and widely prohibits slavery, the implicature might be that unjust material conditions prevent enslaved people from making their own decisions.

Thus, I submit that it is the background material conditions (including structures of power) in a context of utterance that incline the seemingly 'default' implicatures of social generics. We may decide to avoid certain social generics (as Haslanger supports) and their sibling statistical statements (as I suggested is a consequence of taking Haslanger's view), but neither of these measures reaches the bottom of the matter. The problematic implicatures of certain social generics and statistical statements are symptoms, rather than the causes, of material injustices. Thus, rather than avoiding generics to avoid their problematic implicatures concerning unresolved societal injustices, I think that we would be better served in making explicit what would otherwise remain implicit while using these generics.

In good clinical reasoning, this process would amount to educating healthcare providers on the material conditions that bring about the regularities expressed by generics. Gay men contract HIV because of

the neglect of public health institutions to protect gay men from HIV, because of the higher incidence of bleeding from anal intercourse, etc., not because gay men are cursed by God or careless (recall that gay men were, in fact, found more likely to use barrier contraception than heterosexual couples, Glick et al. 2012). Smokers develop lung cancer, not because they are *by nature* weak-willed or lack the intelligence to quit (and thus 'deserve' to live with their illnesses, see Björk, Lynøe, and Juth 2015). Smokers develop lung cancer because of tobacco corporations' morally reprehensible marketing tactics designed to prey on people in low-income communities and the intentional undermining of reliable scientific findings about the dangers of smoking, stoking substance use disorder in the interest of mounting profits at the expense of human life (see Lee et al. 2015 and Brandt 2012).

I think that avoiding generics leads to avoiding crucial discussions about the social structures that bring about injustices in a society. Especially in clinical reasoning, we make a grave error in dismissing generics owing to fears about their implicatures. These problematic implicatures are just a reflection of what interpreters are inclined to infer based on background material conditions. But with access to education about societal injustices (which we should think quite possible to provide clinicians, who undergo years of formal education), the prejudicial implicatures need not be the default.

In fact, generics can be used to highlight structures of oppression (see Ritchie 2019). A generic like 'Black women's reports of pain are not believed' is powerful precisely because it need not apply to a majority of Black women nor be characteristic solely of Black women to be an acceptable generic (i.e. the generic is striking). The generic instead points to a regularity brought about by prejudice in the medical context. Moreover, we should think that promoting this kind of understanding involving generics leads to good clinical reasoning. If clinicians are able to articulate the mechanisms by which social determinants of health (e.g. living in urban areas, lacking access to transportation, having a certain race, gender, or sexual orientation) lead to their corresponding health outcomes (e.g. air pollutants, disturbed access to medications, prejudicial treatment), they will be better able to understand the import of social and patient history data while diagnosing, managing, or prognosticating medical problems.

We can now revisit the case of the doctor and his brunette patients. If the doctor comes to believe 'brunettes exaggerate their pain,' believes 'hair color has a relationship to exaggerating pain,' *and* somehow 'hair color has a relationship to exaggerating pain' turns out to be true, we

still have not reached the end of the story. In a society where brunettes are considered dramatic *by their nature*, the default implicature of the generic may be problematic. The doctor's generic may unwittingly assent to the prejudiced belief that brunettes are, by their nature, dramatic and deceitful.

But the doctor should not accept this explanation, even in a societal context that seems to endorse it. Rather, the doctor should investigate other causes for the regularity he has observed (e.g. are brunettes in this society usually not believed about their pain, therefore they exaggerate to increase their chance of receiving urgently needed medical care?). Generics need not prompt us to accept the status quo.

6. Statistical statements compared to generics in clinical reasoning

In the previous two sections, I argued that generics are well-suited for clinical reasoning, despite the **Truth-Aptness Problem** and the **Social Generics Problem**. Yet, it is too hasty to presume that generics are the best sorts of statements for communicating particular kinds of clinical data. In this section, I consider statistical statements as alternatives to generics and examine whether they lead to better clinical reasoning than generics, as well as consider how they fare on the two problems of generics considered in this paper. I consider statistical statements (e.g. '15% of smokers develop lung cancer' and '16.7% of gay men contract HIV') as replacements for generic statements (e.g. 'Smokers develop lung cancer' and 'Gay men contract HIV').

6.1. Truth-Aptness and statistics

Statistical statements are attractive because they carry a fair deal of precision when referring to the likelihood of properties or events. On the score of truth-aptness, they seem to completely outclass generics.

However, it's not clear how this precision cashes out for good clinical reasoning. Suppose that heart failure is a possible side effect of some medication *A*. Suppose that the rate of heart failure in patients taking medication *A* is 50%. A good clinician would likely conduct regular laboratory and imaging tests to check a patient's heart function if they are taking medication *A*.

Now suppose that the rate of heart failure in patients taking medication *A* is 5%, or even 1%. Would the good clinician decide to conduct

regular testing for heart function? Probably. Given the possible harms to the patient (even if the chances are relatively remote), it's hard to imagine that someone actively engaged in good clinical reasoning would not exercise prudence, whether the rate of heart failure with medication *A* is 50% or 5%.

Conversely, suppose that the rate of heart failure in patients taking medication *A* is *extremely* low. Perhaps 0.000001% of patients have ever experienced symptoms of heart failure on medication *A*, such that it's difficult to ascertain if there is any real association. In a case like this, the good clinician would likely refrain from unnecessary testing (perhaps so long as the patient has no history of cardiac problems).

Moreover, the corresponding generic will track exactly this change. In cases where the rate of heart failure in patients taking medication *A* is 50% or 5%, the appropriate generic might be 'Patients on medication *A* develop heart failure.' In the case in which the rate of heart failure in patients taking medication *A* is 0.000001% (or some other sufficiently low percentage), the generic 'Patients on medication *A* develop heart failure' would no longer be appropriate. Generics, representing generalizations, track the sorts of decision-making we would want from good clinical reasoning, and are thus no worse than statistical statements on this score.

A similar line of reasoning can be taken for diagnostic purposes. Even if condition *A* is statistically more likely than condition *B* given a certain patient presentation and history, both conditions would be considered by a good clinical reasoner if condition *B* is sufficiently severe. This inclusion would be the case regardless of whether generics or statistical statements are the atom of clinical reasoning. Accordingly, the increased precision of statistics do not seem to result in better clinical reasoning.

Further, statistics are not at all straightforward to project. While a statistic like, '33% of patients with diabetes develop chronic kidney disease' might be accurate, projecting the statistic to a particular diabetic patient is challenging. For example, some regularity (e.g. diet, blood glucose management, medications) affecting which third of diabetic patients develop chronic kidney disease is not itself represented in the statistic, complicating the application of the statistic to an individual (see Munton 2019). The projection of a statistic to an individual is an inductive inference, which is similar to a generalization within a relatively restricted domain. Someone making an inductive inference projects perceived properties from a group onto its individuals, whereas someone making a generalization projects perceived properties from individuals onto their group. These parallel pathways are open to adjacent

weaknesses. The projector of a statistic needs to determine whether the target individual actually shares the domain of the statistic, a process which invites inaccuracy when making predictions about patients, if the regularity that accounts for the statistics is not understood.

For example, suppose that it is true that 16.7% of gay men contract HIV. Suppose that James is a gay man who has only oral, but not anal, sex. While it is true that 16.7% of gay men contract HIV and that James is a gay man, it does *not* follow that James is around 16.7% likely to contract HIV. The statistic cannot be projected to James for a few reasons, but the clearest one is that James participates only in oral sex, which has a far lower risk of transmission (Tebit et al. 2012). Numerous factors like these are at play for any individual, so the degree to which a statistic accurately projects to an individual is not guaranteed to be high. Ultimately, the generic 'Gay men contract HIV' (or perhaps the generic 'Gay men have anal sex') underlies the projection of the target statistic to an individual gay man. So, even statistics, which appear to be precise and provide good predictive value, rely on background generics for their projections.

Thus, while a clinician might command a broad base of statistical information about disease progressions, prognoses, and medical management options, the clinician is not, in principle, better at clinical reasoning as a consequence of this moderately increased truth-aptness capability.

6.2. Social groups and statistics

Even with respect to problematic representations of social groups, I claim that statistical statements are no better than generics from clinical reasoning.

In section **5**, I described how believed generics can be either rational or irrational. With this understanding, we identified that seemingly prejudicial generics are almost always irrational to believe, and those that are not irrational to believe need not carry loaded implicatures.

Statistical statements, on their analogous scores, are similar to generics. That is, a false statistical belief will be a false belief, and a statistical belief adopted contrary to one's other rational beliefs will incur a charge of procedural irrationality.

These exclusions leave us with true statistical beliefs, which can still be misleading. Consider the (at least somewhat accurate) statistical claims '66% of people with HIV are gay men' and '88% of people with lung cancer are/were smokers.' These statistics convey some precise information but are silent on a range of matters. Whether something about

the *nature* of gay men or smokers, rather than social factors, drives the statistics, is not conveyed. Further, the conditions that contribute to the regularity conveyed by the statistics (e.g. anal sex, income level), are not presented in the statistical statements. These are the same potential deficiencies we noted in generics earlier. Statistical statements are then at least on a par with generics for descriptions involving social groups.

However, there are also some reasons to think that generics fare better than statistical statements for representing social groups. A generic can be intuitively true (and, in my view, rational to believe) even if the generic applies only to a minority of the group (e.g. 'mosquitoes carry West Nile virus') because the feature being described is still conspicuous (i.e. characteristic or striking). For example, the generic 'Black women's reports of pain are not believed' is an acceptable generic because it points out an alarming regularity about prejudice in the medical context. Further, it is supported by evidence suggesting that laypeople, medical students, and medical residents hold false beliefs about race and pain (Hoffman et al. 2016). Now, suppose (for the sake of this discussion) that the following statistical statement is true: '5% of Black women's reports of pain are not believed.' The bare statistic does not communicate the alarming regularity that underlies it. Moreover, interpreters of the statistical statement may fail to appreciate the alarming ramifications of the statement since the semantic content of the statistic conveys only that 5% of Black women's reports of pain are not believed. The precision of the statistic might even be a distractor from the pressing ramification of the statement (similarly to how the statement '52% of American homicide convictions are of Black people, despite Black people constituting 13% of the population' can distract from the social structures that lead to the regularity expressed by the statement).

By contrast, generics are often acceptable regardless of the proportion of the target group to which it applies. And, as I suggested in the previous section, promoting awareness of the social structures that bring about the regularities expressed by generics (especially among clinicians) can facilitate addressing societal injustices, rather than ignoring them.

7. Conclusion

In this paper, I introduced two concepts (i.e. clinical reasoning and generics) and have attempted to show the relationship between them. I provided a novel account of clinical reasoning as an integrative process involving numerous types of clinical data with the aim of diagnosing,

managing, or prognosticating medical problems. Then, I provided some examples of how generics contribute to clinical reasoning and introduced two problems that arise from employing generics in clinical reasoning. The first of these problems I called the **Truth-Aptness Problem**, by which even intuitively true generics can license inaccurate judgments about the frequency of events or properties. The second of these problems, the **Social Generics Problem**, was about the capacity for generics to lead to prejudicial beliefs, which would then impair clinical reasoning.

I argued that the **Truth-Aptness Problem** is not as bad as it seems when it comes to good clinical reasoning, since the process of differential diagnosis (which includes being attuned to severe, even if unlikely, possibilities) does not involve merely awareness of likelihoods. On this score, generics are actually quite strong for clinical reasoning, since they direct attention to *conspicuous* features of disease processes (e.g. majority, characteristic, strikingness/perniciousness).

I also argued that social generics are not necessarily tied to the prejudicial problems with which they are often associated. I suggested that prejudicial generics are often irrational to accept (including in a procedural sense of rationality) and that even intuitively true generics need not necessarily carry prejudiced implicatures. Indeed, generics can be put to good use in representing social determinants of health and potentially encouraging non-essentialist thinking about social groups.

Finally, I argued that statistical statements, which may seem tempting alternatives to generics, are either worse or no better off than generics for clinical reasoning, including the two problems of generics introduced.

This discussion has a few relevant implications for medical practice and training. First, my account of (good) clinical reasoning may be put to work across other topics in the philosophy medicine, such as the process of clinical inquiry (e.g. what distinguishes good from poor clinical data collection) – since relatively little philosophical work has been done on an ontology of clinical reasoning, this area may be ripe for further exploration. Further, if generics are better for clinical reasoning (than statistical statements), it is unclear that even optimally trained machine learning algorithms will fare better than traditional clinical reasoning from generics. While error opportunities may be reduced in artificial intelligence, generics (in that they attune the speaker and interpreter to *conspicuous* features, whether these features are statistically likely or not) capture what we want to be captured in good clinical reasoning. In addition, it stands to reason that machine learning algorithms built and trained primarily on statistical data may fail to represent social determinants of

health or to engage in structural thinking about healthcare. That is, a bare statistic like '16.7% of gay men contract HIV' does not track the regularities that make such a statistical statement true.

Likewise, it is unclear that good medical education comes down to precisely and efficiently recalling the likelihoods of certain disease progressions based on clinically relevant data. Generics, for clinical reasoning, can get the job done. With an emphasis on helping medical trainees develop awareness as to what social structures bring about the regularities expressed in generics, I think that generics can even get the job done well.

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