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Technology and Scientific Authority in United States Abortion Policy: Concerns Over a Mechanistic Approach and a Better Way Forward

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ABSTRACT

Building on the pragmatist philosophical tradition and work done by scholars in the field of feminist technological studies, this paper considers abortion as a case study to examine how science and technology interact with systems of knowledge, truth, and power. Paying special attention to how technological authority and notions of expertise have influenced public policy and legislative agendas, I consider the role of technological artifacts in shaping our realities and our legal frameworks. Through a historical review of changes in abortion policy and in conversation with various social philosophers, I make the argument that scientific information has not objectively informed abortion opinion and policy, but rather always been a tool of power, reflective of and contributing to larger systemic inequalities. Moreover, because the fundamentally nuanced biology of human fetal development directly conflicts with the legal and moral urge to clearly demarcate personhood from non-personhood, I outline why any attempts to define personhood or viability based purely on biological evidence is arbitrary, deceptive, and ultimately inappropriate. For this reason, I conclude by advocating for the use of a more contextual approach to policy making, considering larger sociopolitical dynamics of gendered power and oppression as well as the lived experiences of those impacted directly by the legislation. In the current political moment, technology is playing an increasingly large role in our lives, and access to abortion and reproductive rights are being actively threatened by those in the highest ranks in the US government. This paper attempts to provide a deeper understanding of the philosophical journey our society took to reach this junction and suggest a better path forward, centering the values of democracy, dignity, and justice.

INTRODUCTION

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On February 14th, Kentucky lawmakers on the senate floor listened to the beating heart of a pregnant person's unborn baby projected over loudspeakers before voting to pass a bill that bans abortions in all cases where a fetal heartbeat can be detected.[17] Republican Senator Matt Castlen defended the bill using the same logic used to pass countless similar bills across the nation in the coming months, announcing unequivocally, "That child in her womb is a living human being, and all living human beings have a right to life" (Schreiner 2019). Fundamentally, this bill, like all abortion policy, rests upon the metaphysical and moral questions of what qualifies as human life and when human life begins. Senator Castlen, like many contemporary law makers, drew answers to these questions from information made possible only through technology – in this case a heartbeat detected by vaginal ultrasound – highlighting the power of technology and science in shaping the human experience of and in the world and our understanding of complex moral issues.

The realm of law and policy is where answers to these questions become institutionalized and conceptions of personhood become operationalized, offering a key space to analyze how scientific development influences public health and discourse through its influence on legislation. The controversial nature of the debate and rich legal history demonstrates that abortion is a prime topic to examine the mutually informed and reinforcing relationship between science, morality, power, and policy. It also invites reflection on how scientific knowledge and technology reflect and reinforce broader constructions of power and value. Accordingly, this paper will explore diverse perspectives relating to ontological personhood with reference to philosophical, theological, anthropological, and biological arguments to explore how power and authority are inextricably tied to the creation of knowledge. This linkage requires us, if we are operating with intellectual integrity, to consciously state our values, and choose to prioritize sources of authority that align with those values in the creation of public health policy. This essay will make the case that democracy, dignity, and justice are the relevant values at play in choosing sources of authority for this issue. Science as a discipline struggles to comment on those values, necessarily abstract and ambiguous, which is why progress on narrow, technical questions – such as fetal personhood – mistakenly leave the genuine issues by the wayside while maintaining structural inequalities. For these reasons, I maintain that scientific authority alone should not dictate reproductive health policy. Instead, this paper will argue that the conversation about abortion will only address the most important questions if we consider the broader context surrounding this issue and explicitly incorporate appropriate sources of moral and intellectual authority in the policy making process alongside scientific knowledge.

A PRAGMATIST ACCOUNT OF TRUTH AND KNOWLEDGE

Various philosophers and historians of science, especially those of the pragmatist tradition, contend that so-called scientific "truths" are not absolute, apolitical, nor objective, but socially constructed, open to change and influenced by power and political interests (Rorty 1991; Kuhn 1979; Latour & Woolgar 1986; James 1907; Dewey 1927). For example, emphasizing the fluid and procedural nature of verifying truths in the general sense, leading American philosopher William James wrote that, "The truth of an idea is not a stagnant property inherent in it. Truth *happens* to an idea. It *becomes* true, is *made* true by events." (1902: 920, my emphasis). Likewise, Bruno

Latour and Steve Woolgar, both sociologists of science, challenge rationalist ideas about truth and consider science specifically as a discipline according to a pragmatist framework. In an anthropological account of life in a laboratory, they explain how scientific facts are neither objective nor intrinsic reflections of reality, but rather are created by scientists who are influenced by socialization much as any other member of society (Latour & Woolgar 1986). Under this construction, knowledge is not necessarily correspondent to reality or "truth" (in the universal, impossibly abstract understanding of the word) but instead the outcome of a cyclic process of legitimation and consensus building among scientists, which dictates which questions are asked, what methods are available for answering said questions, and ultimately what scientists are willing to identity as a fact. In his landmark book, *The Structure of Scientific Revolutions*, American philosopher Thomas Kuhn (1970) describes these bounded conditions as the existing "paradigm," asserting that all science is necessarily constrained by conceptual, theoretical, methodological, and instrumental commitments and assumptions about how the world operates. This understanding of knowledge recognizes the inherent subjectivity in all human activity, which interacts with the universe and material conditions but necessarily rests on human translation, interpretation, and analysis of the material world. While many scholars and practitioners alike mistakenly conflate our bounded interpretation of material conditions with notions of rationalistic, unbiased truth and assert that science is therefore objective and apolitical (Tyson 2015), a look at history reveals clearly how scientific facts have changed periodically and been influenced by factors supposedly beyond the bounds of science such as politics, ideological interests, and power.

To illustrate the construction of scientific facts within the larger environment of power dynamics, we can consider the notion of biological sex. Sex according to a male/female binary has traditionally been considered a neutral category of biological analysis in mainstream Western culture, inscribed in laws and resting on the assumption that it is natural and scientifically predictable. Meanwhile, gender is often considered to be a more social phenomenon, an identity not determined purely by biology. Judith Butler (1999) however, along with other postmodern feminist scholars, challenges the commonly held distinction between sex and gender in which sex is viewed as biological and gender as culturally constructed. She asserts that both are culturally constructed and neither neutral (see also Beauvoir 1949; Delphy 1984; Hood-Williams 1996; Hird 2000). Employing an approach to discourse and knowledge-power informed by the work of French philosopher Michel Foucault, she argues that so called "natural" facts around "biological" sex have been discursively produced by scientific discourse in service of other political or social interests, chiefly maintaining a hierarchical system of patriarchy. The cultural construction of biological sex as a phenomenon is evident in how it does not make sense or exist outside of an understanding of and contrast to gender; we can only describe biological sex because we rest on assumptions about gender. Butler argues sex is not inherent but rather a product of gender, which is a product of the patriarchy. In this way, understanding sex as a neutral, objective, apolitical condition of reality mistakenly overlooks the intimate connections between constructions of knowledge and broader power dynamics. The result is the perpetuation of unequal power, under the dangerous guise of neutral, objective truth. The pragmatist philosophical understanding of the construction of scientific facts is therefore core to an analysis of abortion and reproductive

rights politics. These policies, and the debates around them, increasingly revolve around supposedly neutral scientific arguments without an adequate recognition of their history, social context, and inherent relationship to gendered power dynamics.

In relation to abortion, a similar dynamic is visible in the biological construction of the trimester system and conditions of fetal "viability." These now common concepts are not inherently reflective of biological development, but rather products of legal and political pressure which has molded scientific research and knowledge creation. Landmark Supreme Court case Roe v. Wade (1973) established the constitutional right to obtaining an abortion, qualified with temporal conditions under which access is restricted. Growing from an assumption that the state has a legitimate interest in protecting both the pregnant person's health and the "potentiality of human life," the ruling outlines the trimester system and conditions of viability, establishing three stages of development where the rights of the pregnant person and the rights of the State (acting on behalf of the "potential human life") compete at "compelling points" as the pregnant person approaches term. The ruling asserts that the state obtains the power to regulate abortion only in the second trimester, the "stage subsequent to viability." This profoundly significant legal language implies biological articulation of the moment of fetal personhood and scientists have consequently made efforts to define viability through technical means.

Despite the importance of scientifically defining personhood and viability for legal jurisdiction, biological study of prenatal development has revealed principally that conception and fetal development are continuums, with many points and processes between conception and birth that one may relate to be the beginning of human life (Beller & Zlatnik 1995, Flower 1984; Rysavy et al. 2015; Jones 1989). Nevertheless, biomedical research has explored a various markers of personhood, giving rise to various biological terms such as implantation, conception, viability, and neuromaturation that have been strategically employed by policy advocates and philosophers alike to argue for the scientific backing of their moral claims about abortion (Brody 1975; Goldenring 1985; DeFede 2019; Congregation of the Doctrine of the Faith). Ultimately though, the grey area inherent in biological development reflects that attempts to demarcate the process according to biological attributes are arbitrary and artificial. Scientists have attempted to define these categories because lawmakers constructed them. As with sex and gender, the facts reflect construction through legal discourse and not any underlying, neutral, objective truth about reality or observable material conditions.

Because knowledge creation is subjective, scientists often have difficulty reaching clear technical conclusions when articulating their findings and often refrain from making conclusive moral claims. Beller & Zlatnik (1995), for example, in discussion of the trimester system, reflect hesitation in using hazy biological evidence as the basis of legal rulings, asserting that, "it is a questionable practice to use weeks of pregnancy to determine viability." They argue that the question of viability and fetal personhood is less a scientific enterprise than a "spiritual" one, and that the various biological measures of personhood upon which legal jurisdiction are based (i.e. neuromaturation, implantation, viability, potentiality) are reflective more so of the political interests dominating legislative bodies at the time than fetal developmental reality. Similarly

reflective of the haziness of biological evidence, Flower (1984) discusses the results of his research on neuromaturation:

> We can say a few things about fetal neuromaturation with some assurance: central nervous system activity begins early in development; fetal motor activity is spontaneous; and the neocortex completes its inclusion into the neuraxis after mid-gestation. On the other hand, these findings fall far short of serving the tasks we would like to ask of them. They permit us to make very little headway on the question of fetal sentience, for example. (248)

Jones (1989) also writes about the failure of his research on electroencephalogram (EEG) technology in providing clear evidence in favor of absolutist views of personhood, claiming it allows only for generalizations. He asserts that the overwhelming impression of brain development is only that of its gradualness and "what follows from that is that, at present at least, it is impossible to recognize a distinct point of transition from a 'non-brain' to a 'brain', or from a non-functioning nervous system to a functioning one" (176). Scientists themselves seem to recognize the subjective nature of their knowledge creation, and the difficulty of coming to clear technical solutions. This reflects, perhaps unwittingly to them, the danger of compounding scientific truth, authority, law, and morality in a rationalist sense in which scientific truth holds unlimited authority over policy and law - and thus our morality and lives.

Scientists' tentative positions stand in stark contrast with how some bioethical philosophers have appropriated the "evidence" of neuromaturation in moral arguments against abortion. Goldenring (1985), for example, asserts that "brain birth" is the morally significant threshold for life, at which point abortion becomes morally impermissible. By implying that the brain has a definite moment of life and using scientific evidence (albeit misunderstood) in defense of moral claims, he not only fails to recognize that scientific facts are not absolute or inherently true but also suggests a belief that technical answers have the capacity to answer philosophical or moral questions. Legislators have taken a similar approach, visible in the plethora of proposed state policies that ban abortion according to technical biological criteria, including conception, gestational duration, and viability (Guttmacher Institute 2019). Nevertheless, common across discussion among scientists is the conviction that their findings fall short of answering the central questions at hand and of urgent desire for policy makers: what constitutes human personhood and when does it begin? The fundamentally nuanced biological reality directly conflicts with the legal and moral urge to clearly demarcate personhood from non-personhood. This tension makes any attempts to define personhood or viability based purely on biological evidence arbitrary, deceptive, and ultimately inappropriate.

TECHNICAL AUTHORITY, MORALITY, AND POWER

The dynamic interplay between law, science, and morality is not a recent phenomenon and a historical account of abortion legislation across time reflects how scientific knowledge has influenced and been influenced by social, legal, and political factors. While the contemporary context may lead us to assume that abortion has always been a source of controversy or

criminalized in some capacity, historical records reveal that abortion was largely a non-issue until the 1900s and today's legal approaches are, much as the medical diagnostic technology invoked in their support, in the words of Justice Blackmun, of "relatively recent vintage" (Roe v. Wade 1973). Ancient societies across the world engaged in practices of fertility control through contraception and abortifacients and abortion was not commonly banned (Riddle 1994). Over time, building on Aristotelian ideas of embryology which described a process of gradual hominization and defined the "quickening," the moment when the pregnant person first perceives fetal movement, as the moment in which life in the womb becomes human, laws began to shift in favor of restricting mid- to late-term abortions. English Common Law in the Middle Ages, for example, declared abortions a criminal offense only after the "quickening," permitting them freely before (Mohr 1978). Across this time period, medical diagnostic technology remained limited and engagement with life in the womb rested generally on directly tactical physical perceptions and abstract metaphysical conceptions of life. Laws rested primarily on the authority of moral arguments rather than modern scientific or technical evidence.

The late 19th century introduced a turning point, establishing the roots of the legal regime still in place today and unmistakably tied to the development of modern scientific-technological systems. In 1857, the newly formed American Medical Association (AMA) created a Committee on Criminalizing Abortion and adopted an unprecedented resolution calling on states to criminalize removal of any zygote, embryo, or fetus growing inside a pregnant person (Castuera 2017). Growing from post-Enlightenment ideals of scientific rationality and built upon technological advancements, especially the stethoscope (developed in 1816), the doctors forming the AMA realized that the "quickening" was not the beginning of human life and conception and gestation constituted a continuous process of development. As science increasingly replaced religious doctrine as a source of authority in a widening set of public domains, especially education and law, the AMA's medicalization of and technical approach to abortion caused key changes in public policy (Castuera 2017). Science attained an unprecedented level of cognitive authority as academic disciplines became operationalized and technical medical experts gained direct influence over policy unlike ever before, a result of the concentration of divisions of knowledge (Barnes 1985). Accordingly, restrictive abortion legislation gained traction in the 1860s, first criminalizing abortion as a misdemeanor with only the abortion practitioner at fault, and then evolving into a felony charge with the pregnant person and the abortion practitioner facing charges (Crosby 1980: 357). These laws, which relied upon newly available technical knowledge in answering moral questions, remained in place until questioned by legal challenges in the late 20th century, namely Roe v. Wade (1973).

Interestingly, medical diagnostic technology and the AMA's technical approach to abortion also influenced religious perspectives in unforeseen ways, indicating the influence of science on religious morality as well as secular. With reference to the absence of direct discussion of abortion in both St. Thomas Aquinas' Summa Theologica and the Bible, Castuera (2017), argues that "religious dogmatism and ethical certainty on abortion were rare in the past and only became dominant themes in the 19th century" (121). This is clear when one considers that the Vatican became staunchly rooted in the belief that conception marks the beginning of the sanctity of life

only in the mid-1800s. Only after the AMA began to push their anti-abortion campaign did the Catholic church incorporate abortion into the framework of the 5th Commandment ("thou shalt not kill") and declare abortion at any stage a grave sin with the rationality that "human life must be respected and protected absolutely from the moment of conception. From the first moment of his existence, a human must be recognized as having the rights of a person, among which is the inviolable right of every innocent being to life" (Congregation for the Doctrine of the Faith). This bioethical perspective, inspired largely by technical advances and AMA's scientific approach to the moral question of abortion has held fast and many contemporary Catholic leaders remain staunch in their position that abortion is a "serious evil" and morally equivalent to homicide (Pacholczyk 2018). The influence of these ideas has permeated beyond the Catholic church into politics as well.

In response to Roe v. Wade, various groups have challenged the assumption that viability constitutes personhood, often combining religious arguments with information only recently accessible with new technological advances. Especially influential in national politics, the Republican Party broke from a historically pro-choice position and adopted a platform in 1976 that promised an anti-abortion constitutional amendment, with the assertion that the sanctity of life begins at conception (Williams 2011). This decision radically shifted national legislative politics and political culture and led to increased state-by-state legal restrictions resting on the treatment of an embryo as person from the moment of conception. Accordingly, states began to criminalize the killing of early embryos with feticide or fetal homicide statutes, recognized civil claims for damages against anyone who negligently causes the wrongful death of an early embryo, and gave early embryos all the rights and protections conferred on children (Peters 2006: 200-201). With further development of medical diagnostic tools and the advancement of ultrasound technology, technical scientific arguments were employed to further support bans on early abortion. "Heartbeat bans" such as that introduced in Kentucky earlier this year which restrict abortion from the moment a fetal heartbeat is detected have gained popularity recently, drawing on data collected with the help of vaginal ultrasound technology (Heartbeat Bans Legislative Tracker).

As evident in the historical shift in approach to abortion spurred largely by increasingly technical methods of analysis, technological artifacts, as manifestations of scientific theory, have a core role in shaping perspectives and carry an inherent political salience. In the translation of the ideas revealed with technology into public policy, technology has the indirect capacity to perpetuate hierarchies of power and therefore must be considered in their larger socio-political context much in the same way we do so with scientific truths. The context of abortion politics requires this particularly given the heavy reliance on medical diagnostic technology. Political theorist Langdon Winner (1986) proposes that technological advancements are not merely neutral aids to human activity, but rather powerful forces that actively shape human activity and meaning. In Winner's view, technologies carry political significance because they shape arrangements of power and authority in society. Although many describe technology as neutral in the same way that scientific knowledge is viewed as neutral and objective, Winner makes it clear that technology is assuredly political and subjective, writing that "technology is [potentially]

implicated in perpetuating antidemocratic power relations" (7). In the context of abortion, this dynamic is visible in how the technological regime in place in a given historical context directly influences how politicians and religious leaders alike think about personhood and manage questions of reproductive rights, making claims of control over people's bodies accordingly.

Developments in ultrasound technology in particular reflect a key example of how technological innovation drastically shapes not only understandings of the phenomenon in focus but also broader social questions and power dynamics. To understand how dramatic the development of ultrasound technology was, we must first consider how the introduction of this technology created a shift in perception. Flower (1985) writes that, "If once the fetus was a stranger to us, such is not the case today. The fetal human no longer develops unseen but is photographed *in utero*...With the aid of ultrasound, a woman can view the fetus within her body, seeing it move about long before she will be able to feel its stirrings" (237). Ultrasound technology offered an unprecedented opportunity to "peer inside the womb," in doing so radically altering not only norms and practices in pregnancy but conceptions of personhood and the bodily autonomy of people with the capacity for pregnancy (shortened PCP from now on). At its most dramatic, this new technological viewpoint has led some to view PCP in strictly reproductive terms, reducing the pregnant person to simply an objectified vessel for new life, lacking agency or subjectivity themselves. For example, incoming Florida house speaker Jose Olivia recently referred to PCP as "host bodies" five times in an interview with CBS News when asked a question about abortion, placing moral emphasis entirely on the fetus and overlooking the pregnant person's fundamental personhood (DeFede 2019).

Technological advances, in their seeming ability to show us a reality "more real" than that which we observe without the technology, also fundamentally change our relation to truth. Cultural anthropologist Lisa Mitchell (2001) asserts, like Winner, that technology, in this case sonography, is not passive nor neutral. Rather, she argues it changes our relationship to ourselves, each other, and larger metaphysical ideas of truth. She writes, "I look at ultrasound images not as neutral windows onto the fetus but rather as artefacts emerging out of particular historical, social, and cultural contexts" and encourages us to consider "the extent to which fetal images may engage, contest, and transform other meanings, for example about nature, technology, identity, normality, gender, and motherhood" (4). Viewing ultrasound technology in the way in which many view sonographic images - as a "neutral window" that lets us better "discover nature" - reflects a rationalist tendency to view scientific development as the key to understanding the abstract nature of the universe. Yet as I have discussed, this view is mistaken because it overlooks the fundamental subjectivity of scientific truths, as well as the broader impacts of technologies that stem from those scientific facts. Mitchell, like Kuhn and Latour & Woolgar, make clear that we must come to a better understanding of how technologies and the scientific knowledge they inform are connected with the surrounding historical, social, and cultural contexts.

Scholars in the field of feminist technological studies (FTS) have done precisely this. In particular, they have considered how technology interacts with gendered social hierarchies and reinforces dynamics of power and privilege and how technological regimes are both productive and reflective of the surrounding cultural and political regimes. This is surely the case with

medical diagnostic technology such as ultrasonography. Taylor (2008) argues that ultrasound technology, in entering public consumer culture, has changed women's perceptions of their own subjectivity and embodiment, which are now "rendered newly problematic by technologies of visualization" (29). Her use of the word "problematic" references the increased erasure of pregnant people's agency from conversations about abortion, seen for example in Olivia's characterization of PCP as mere "host bodies." American Political Scientist Rosalind Pollack Petchesky (1987) similarly highlights the critical social and political significance of sonographic imagery in an analysis of how ultrasound photographs and videos operate within a larger "rhetoric and politics of vision" to increase the medical intervention in pregnancy that ultimately renders pregnant people as increasingly objectified and under state control. As the focus shifts to fetal life, adult pregnant people themselves become nearly invisible (or rendered non-human) given the emphasis on their identity in purely reproductive terms.

This dynamic is visible in how the Christian Right and the Republican Party utilized ultrasound technology in their pro-life political strategy, beginning with the Women's Ultrasound Right to Know Act (Rodrigues 2004). Inspired by a study that claimed that early fetal ultrasound examination increases maternal bonding and possibly resulted in fewer abortions (Fletcher & Evans 1983), they began pressing for mandatory ultrasounds in the hope that it would dissuade abortion. Rodrigues characterizes these measures as an intervention of gendered Foucauldian biopower, highlighting how women's bodies and agency became increasingly under State control in the process. Rodrigues describes biopower as "the processes by which human life, which includes biological and anatomic 'mechanisms' as well as vital processes at the population level (e.g., birth and death rates), are rendered measurable and controllable by discourses, practices, and institutions of power" (57). In this framework, Right to Know measures gave the State increased permission to control PCP bodies while simultaneously diminishing PCP's bodily and sexual autonomy. In this way, technology "mediated reality and the politics of gender and reproduction" (Mitchell 2001: 4). Therefore, discussion of the fetus and ultrasound technology is inseparable from talk about gender and power. Viewing medical technology in this light changes our understanding of scientific development and adds a critical layer to our understanding of abortion history. If we consider the technological regime as fundamentally tied to dynamics of power, it becomes clear that the increased technological management of pregnancy across time (by predominantly male medical professionals) has rendered PCP with less power and autonomy over their own bodies. We are thus presented with the question of what we can do to address this historic imbalance and create a more egalitarian and democratic future in which "as a matter of justice, people [are] able to influence the basic circumstances of their lives" (Sclove 1995: 25).

AN ARGUMENT FOR PRIORITIZING DEMOCRACY

Before continuing to suggest a possible path forward with regards to the role of science and technology, it is worth taking a moment to justify my preference for democracy and explain what I mean by the term. My preference for democracy is rooted in an understanding of strong democracy, in particular. Strong democracy, as theorized by political philosophers and political scientists, describes a condition in which citizens have access to power and say in society in a

substantive sense, giving them control over the conditions of their lives. Ample literature has suggested the urgent need to "deepen" democracy in societies around the world, emphasizing that strong democracy entails more than just establishing a set of policies and institutions that appear democratic in the minimal sense (Dewey 1927; Skopkol 2003; Rice et al. 2015; Crenson et al. 2002; Cornwall 2002; Collier & Levitsky 1997; Gaventa 2006; Lukham et al. 2000; Fung, Wright, & Abers 2003). Gaventa (2006) pictures democracy as an ongoing process and explains the need to critically examine the inclusivity and substance of democracy, "especially in terms of how citizens engage with democratic spaces to create more just and equitable states and societies" (8). Along similar lines, Rorty (1999) claims we must be maximally inclusive of all citizens, "extend[ing] the reference of 'us' as far we can see." Citizens' participation in this framework goes beyond the "trivial role" of simply engaging in representational electoral politics; in a deep democracy, lay people have access to not only voting but the agenda setting process itself, built upon access to technical knowledge and the authority that comes with it (Sclove 1995: 241). Sclove suggests that deep democracy gains legitimacy, ostensibly over other forms of non-democratic governance (i.e. authoritarianism, oligarchy, dictatorship, monarchy), because "only democratic forums can supply impartiality born of the balance among multiple perspectives, the opportunity for reflection, and the full range of social knowledge needed to reach this determination" (38). Inspired by thinkers such as these, I am convinced that a strong democracy, in which politics is deeply participatory and responsive to citizens, there is a distributive access to authority over agenda setting, and citizens have substantive agency in political processes, is an ideal political arrangement. It seems to provide the best means of ensuring citizens are treated with dignity and equality.

Relevant in the context of this paper with its consideration of medical diagnostic technology, sociologist S. Barry Barnes (1985), building on the work of German political philosopher, Jürgen Habermas, considers the role of technology in democracy. He describes two types of anti-democratic societies that restrict access to authority and power and limits the public's engagements with the agenda setting process. First, "technocratic" societies are those in which technical experts *alone* have direct control of political activity. In contrast, "decisionist" societies include a layer of political elites who mediate between the public and technological experts. In both cases, the great mass of society is largely still "depoliticized," or effectively cut off from any real involvement in ongoing political activity (100). Barnes asserts the danger of falling into the trap of technocracy, in which important social questions become reduced to "small problems of management and maintenance," and "society becomes perceived as a smoothly operating machine needing regular servicing and occasional repair" that only technical experts can provide. This monopoly over power is undesirable according to our framework of strong democracy and should be avoided when we consider how technology and science interact with public policy.

A CONTEXTUALIST WAY FORWARD

Informed by a commitment to a strongly democratic approach, I suggest we can ground a framework for moving forward with regards to abortion politics in an understanding of what American philosopher Stephen Pepper calls "world hypotheses." An analysis using Pepperian

world hypotheses both offers a suggestion of what might be contributing to the challenge of answering the questions posed in the debate currently and gives us a more desirable way forward. Pepper (1942) proposes that four "world hypotheses," each grounded in a root metaphor, explain how most people operate in and make theoretical sense of the world. They are broad collections of assumptions about the nature of systems and objects and their relationship to each other that dictate how people integrate information and how they approach problem solving. Mechanism, grounded in the root metaphor of the machine, is the world hypothesis that describes the dominant approach to abortion policy. Mechanism attempts to provide cohesive explanations of concrete phenomena and strives to makes causal claims, with the assumption that one can understand how the world works if one understands the "cogs" at play in the "machine." A mechanistic approach suits most scientific endeavors well and is visible in the approaches taken by the biologists and policy makers with regard to defining fetal personhood and drawing moral claims from technical biological evidence. Most researchers studied a limited aspect of fetal development and attempted to explain a particular fact in depth by studying the parts at work in the fetal "machine." Lawmakers and contemporary legal history reflect similarly mechanistic tendencies in their acceptance of and reliance on this purportedly concrete and cohesive scientific evidence, such as markers of fetal viability. Policy-making has restricted its focus to the technical question of when human life begins and attempted to answer that question by looking at specific information collected through technology such as ultrasounds or EEG, assuming that if we can come to technical answers we can create good public health policy. That emphasis has been the driving force, overshadowing the larger moral questions of agency and bodily autonomy. This singular focus on technical answers with limited involvement of other sources of popular authority reflects tendencies that are common in what Barnes called "decisionistic" societies, which we should recall are not strongly democratic given their concentration of power.

An alternate world hypothesis, contextualism understands everything in the world to be operating in "intrinsically complex" and "interconnected" events (Pepper 1942: 233). In contrast to mechanism, contextualism is better suited to explain a concept in relation to the bigger picture and is less firmly rooted in an attempt to fit phenomena into a cohesive answer. I propose that a conceptual gap exists in the discussion of abortion between the proposed questions and the mechanism for answering, lending to the difficulty in using science in the debate around reproductive rights and morality. The question of when personhood begins is necessarily broad. It inherently contains considerations of justice, ethics, and personal freedom. So to attempt to answer it using a mechanistic approach that narrowly draws on a constrained collection of biologically evident information is a mistake. A purely mechanistic approach cannot possibly answer a resolutely contextual question, explaining scientists' inability to conclusively do so. Moreover, there is a danger in an overly mechanistic approaching to this issue, as is evident in Olivia's "host body" comment. The constrained scope of mechanism can lead people to view pregnant people as fetus-hosting machines, incubation devices devoid of agency, rather than as a full people. Failing to look beyond the "cogs" thus carries the potential of objectifying PCP according strictly to their reproductive capacities and ignoring the critical importance of human dignity.

Beyond being too narrow, a mechanistic approach may simply be incompatible with the question, making any appeals to biological "evidence" in defense of moral claims purely scientistic. Hanlon (2019) describes "scientism" as the "untenable extension of scientific authority into realms of knowledge that lie outside the scope of what science can justifiably determine." He argues that scientism constitutes an illegitimate appeal. Barnes (1985) remarks that, "the authority of science does not have unlimited scope. It does not extend to the realm of morals" (90). Thus, any attempt to do so is a scientistic misuse of scientific information and must be regarded with skepticism.

All this is not to say science has no part in the making of policy, with regards to abortion or otherwise. Questions involved necessarily rely, in part, on scientific knowledge about the human body and technology has surely led to many social goods in our increased understanding of these processes of development and reproduction. We must only take care in deciding which questions are appropriate for the application of science and which are perhaps better answered by another type of knowledge, say lived experience. As Rorty (1999) writes, "there is nothing wrong with science, there is only something wrong with the attempt to divinize it, the attempt characteristic of realist philosophy" (34). In forming a cohesive policy, Pepper would recommend we employ instead an approach of "reasonable eclecticism," drawing from various world hypotheses and knowledge bases to avoid dogmatism or concentration of authority that results if we remain in a strictly mechanistic worldview. Different problems and questions require different approaches. Recognizing that reality offers us a better opportunity to solve problems, according to the goal of fostering a strongly democratic society. Humphreys & Piot (2012), drawing on their extensive experience in the United Nations Programme on HIV/AIDS, assert that scientific evidence alone is not a sufficient basis for health policy, especially with regards to issues of critical moral significance. They write, "although science should inform health policy, it cannot be the only consideration" because "in a democracy there can be no experts on values." Although they do not use Pepper's terms, their conclusions highlight the importance and efficacy of a reasonably eclectic approach to health policy on a similarly controversial topic.

With the understanding that technological artifacts have political salience, scientific knowledge is imbued in complex dynamics of power, and technical knowledge can be arbitrarily employed in support of political interests, we must approach abortion policy with a more contextualist approach that recognizes and incorporates other sources of moral and intellectual authority, especially that of everyday people who are impacted by policies. To do so requires first a reconsideration of who we consider experts on the matter and who we give authority over policy. Currently, abortion policy reflects a decisionstic tendency with technical experts holding authority and lawmakers relying heavily on biological evidence. If we wish to be more deeply democratic, that must change. Grassroots feminist activism has suggested another, more deeply democratic possibility and urges us to question who we are listening to as authorities on the matter. In 1969, the New York Joint Legislature Committee on the Problems of Public Health gathered to consider reforming the state's abortion laws. Outraged that lawmakers were making this decision based solely on consultation with a panel of "experts" that included just 14 male medical practitioners and a Catholic nun, members of the radical feminist group, the Redstockings, organized a speak-

out and protest. Disguised, activists infiltrated the hearing audience and then disrupted mid-proceeding, shouting at legislators: "All right, now let's hear from some *real experts: the women*!" (Mahoney 2015, my emphasis). The activists were removed, and the hearing was eventually moved to another room behind closed doors, reflecting yet again a decisionistic tendency that concentrated power and put a gendered monopoly on authoritative knowledge. Despite ultimately not changing the policy outcome, the Redstocking activists' bold reframing of who should be considered "experts" with regards to abortion offers an important reminder about the value of citizens' knowledge, rooted in lived experiences. This example reveals the critical significance of considering "the full range of social knowledge" in the policy making process.

Consciously considering medical diagnostic technology's relationship with democracy is yet another way we can encourage a strongly democratic approach in line with a more contextualist worldview. Historically, there has been a strongly *undemocratic* –and often openly misogynistic –approach to reproductive and gynecological technology with cis men hegemonically dominating medical research (intellectual authority), spaces of medical practice (practical authority), and policy spaces (political authority) (Bray 2007; Crosthwaite 2014; Miles 1991; Scully 1980). Given such a trend, adopting a more conscious approach with the critical awareness of how this technology has engaged in gender hierarchies across history is all the more urgent, assuming equality and justice are goals we choose to prioritize. Sclove (1995), in explaining the need for approaching technology with democratic design criteria, asserts that lay people, especially those impacted by the technology, should be involved in both the processes of technological design and policy-making that involves technology and science. In the case of abortion and medical diagnostic technology, that implies PCP's roles have been vastly underrepresented, as the Redstocking activists highlighted in their protest. Using democratic design criteria could change that, in doing so simultaneously avoiding what Winner calls "technological somnambulism," which describes the undesirable process by which we fail to recognize the profound political significance of technology and create or adopt technology without thinking about its larger social implications (9). It could help ensure that technologies and the policies resting on them pass what Sclove called the "reality test," grounded in the daily experiences and concerns of everyday people that expert conclusions often routinely fail to consider in their overly technical approach to problem solving.

Luckily, a more democratic policy-making process is already in practice in other contexts, offering a worthwhile example to consider. To cite but one example, Irish Citizen's Assembly was established in 2016 as a groundbreaking "exercise in deliberative democracy, placing the citizen at the heart of important legal and policy issues facing Irish society" (The Citizens' Assembly; Irish Citizens' Assembly Project). With the help of expert evidence, 100 citizen members (from various backgrounds who were selected to be both random and electorally representative) considered the most pressing and controversial legislative topics, including abortion, gay marriage, and climate change. As a collective, they formed conclusions which were then outlined in reports and submitted to Parliament for further debate by elected officials. In the case of abortion, the Citizens' Assembly recommended, with two third support amongst the participants, a reform of the current Eighth Amendment (which restricted abortion and inscribed an "equal right to life of

the pregnant women and the unborn") to allow unrestricted access to abortions. Motivated by the Citizens' Assembly report, a public referendum to remove the constitutional ban on abortion was put to popular vote and passed with over 66.6% support from Irish voters in May 2018. In a context where touching abortion had been viewed as political suicide by politicians give in controversial nature, this outcome stands as a stunning breakthrough for a seemingly intractable issue that nevertheless carries critical importance for the majority of the population.

This example reveals the possibility of tangible legislative results coming out of such a process and the power of considering alterative models for deep democracy. Doing so can radically transform conversation around highly controversial topics by including the lived experiences of those impacted by policy. For example, one participant member of the Citizens' Assembly explained that, "the members of the assembly were faced with expert testimony on medical and legal matters but also testimony from their fellow citizens whose lives were deeply impacted by the 8th" (Guardian readers and Bannock 2019). The result, as another member described, as increased empathy and the centering of "real people" in policy. Moreover, the process had the impact of encouraging citizen engagement and cultivating civic confidence, at a low in Ireland since the financial crisis of 2008 (Taylor 2019). By taking the debating of contentious issues "right back down into the hands of the people on the electoral roll," it established the belief that this was a transparent process and that voting citizens "were not being preached at or lied to," so often the case in politics (Guardian readers and Bannock 2019). Louise Caldwell, a participant member of the Citizens' Assembly recounted the impact on public trust stating that, "I would definitely take part in a Citizens' Assembly again. I felt empowered and informed – it gave me the language and skills to have difficult conversations" (Caldwell 2019). Another participant called it a "unbeatable process" and suggested Citizens' Assemblies may hold the key to some of the most gridlocked political issues, such as Brexit. With the Irish example appearing an apparent success, perhaps it is time we in the US consider implementing a similar model. Of course, the context is vastly different, and it is not a matter of simply replicating the process exactly, but I believe we could benefit greatly by considering new political arrangements, or at least experimenting with new models, with reproductive health as just one arena that appears ripe for this approach.

CONCLUSION

It should now be clear that abortion laws are not and have never been pure reflections of scientific consensus but rather, "reflections of the interests of a given society at a given time" (Beller & Zlatnik 1995:482). This recognition is powerful as it allows us to move beyond naively rationalist concerns over scientific objectivity and questions of technical accuracy and into broader, more contextualist, conversations that are firmly grounded in the people's lived experiences and hope for a better future. If we hold truth to be the "best pattern of action," as Rorty (1991) writes, we can consciously embrace the subjectivity in knowledge and decide explicitly which values to base our truth on. I have argued democracy, dignity, and justice are worth upholding with regards to this moral question, so will base my concluding analysis on that. With those goals in mind, I argue we ought to consider how best to address needs in society and serve a maximally inclusive community, based on democratic design criteria that incorporates

sources of authority beyond technical medical experts. As abortion is inherently complex and interconnected with many other social considerations, any policy debate thus should incorporate consideration of surrounding dynamics of power and authority and how they engage with technology, knowledge creation, and law. Instead of getting caught up in questions of what constitutes human life and when life begins with reliance only on science and technical authority, a pragmatic and reasonably eclectic approach to abortion policy would suggest that we focus instead on a different set of questions: How are lived experiences being impacted by these policies? How are these technologies engaging in structural power dynamics? Do they deepen democracy with maximal inclusivity?

These questions will re-center the dignity and agency of already living pregnant people and PCP, avoiding the danger of objectifying them in an overly technical approach. Feminist ethicists hold this as critical to any analysis of abortion, maintaining the pragmatic belief that "only by reflecting on the meaning of ethical pronouncement on actual women's lives and the connections between judgements on abortion and the conditions of domination and subordination can we come to an adequate understanding of the moral status of abortion in society" (Sherwin 1991: 757). A more contextual approach will require us to be more creative in our solutions. We might consider, for example, what drives people to receive abortions in the first place, what we might do to better support PCP's sexual agency with birth control and sexual education, and how systems of poverty play a role in the dynamics of sexual agency. Make no mistake that addressing those interrelated and complex questions through policy process promises to be far more difficult than if we continued with a purely mechanistic approach. But I am resolute in my belief that doing so is nevertheless worthy of our time and energy, unless of course we are perfectly comfortable making policy that is undemocratic, misunderstanding of the nature of scientific truth, and actively engaged in perpetuating inequality; I would hope we are not.[18]

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NOTES

[1] This paper deserves a note describing my thought process as it relates to gendered language. Conversations around abortion and reproductive rights, both in academia and beyond, often focus on "women," a term often used with the assumption that a "woman" is someone who has a uterus and can become pregnant. Yet we know that not all pregnant people are women and not all women have the capacity to become pregnant; both human biology and gender constructions are much more nuanced. What this means is that those who are impacted by restrictive abortion legislation are not reserved to "women." Even if these policies were envisioned to target cisgender women with the capacity for pregnancy, transgender and gender non-conforming (GNC) people are impacted in very real ways. This reality highlights the interconnections between various forms of oppression, including misogyny and transphobia. For the purposes of this paper I will therefore be referring to People with the Capacity for Pregnancy (shortened to PCP) and "pregnant people/person" in an effort to be more inclusive of all experiences. I will use the term "women" when using direct quotes and referencing scholars who specifically discuss "women." This approach may be imperfect but it is my best attempt. I gladly welcome any feedback from readers who have other thoughts on how best to navigate the complexities of language!

[2] As a last word, I would like to hold the space to acknowledge that this paper deals with a very personal matter. Despite my rather abstract approach to the topic of abortion, I want to remind readers that real bodies and real lives are directly involved, including my own. I am a researcher and a writer but I am also someone that can become pregnant and am thus directly implicated in the politics I describe throughout. For this reason, this research process was extremely difficult at times. Researching is obviously an intellectual act and less obviously to some, a political act. But it is also an emotional act. To uncover this logic of oppression and these stories of power impacted me deeply in very visceral ways. I share this honestly with you, my reader, because my experience in the research process is as much a part of this story I am telling as my "findings and conclusions"; it deserves recognition and inclusion. More importantly, it does not take away from my credibility as a researcher. I hope that by sharing this vulnerability, I can help open the door for greater discussions around researcher subjectivity and provide space in the often sterile hallows of academia for emotion and self-reflection. Let us not forget that researchers, just as those we write about and for, are human too.