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Dismantling Binary Assumptions in Sex Estimation: Uplifting Trans and Gender Diverse Identities in Forensic Anthropology

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DISMANTLING BINARY ASSUMPTIONS IN SEX ESTIMATION: Uplifting Trans and Gender Diverse Identities in Forensic Anthropology

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Abstract

Forensic anthropology is a study within the field of physical anthropology that seeks to apply osteological expertise to legal and criminal situations. One of a forensic anthropologists' most important jobs is to build a biological profile, consisting of age, biological sex, stature, and ancestry, in correspondence to an unidentified decedent. As we enter the third decade of the 21st century, instances of violence against trans and gender non-conforming individuals are unfortunately prominent, however, there has also been more awareness shed on trans activism. Trans individuals are at a higher risk of being victims of violent crime, and thus, forensic anthropologists have a duty to be both familiar with these trends, as well as adjust our behaviors to be better allies. Forensic anthropologists have no way of discerning gender from the bones of an individual. However, they can attempt to estimate sex through metric and morphological analyzations of the pelvis and cranium and apply those to a spectrum ranging from female to male. It is vital that we value the cross-impact that culture and biology have on one another. Through exploration of methods used with the pelvis and crania, as well as application of queer theories and practices, I establish an understanding of how sex is conceptualized by forensic anthropologists. By applying gender studies and feminist understandings of the sex and gender spectrums to the methods used for sex estimation, I analyze the issues within sex estimation and the possible directions for future integration of gender diversity in forensic anthropology.

Key Words: Forensic Anthropology, Transgender, Non-Binary, Gender Diversity, Sex Estimation

Table of Contents

DISMANTLING BINARY ASSUMPTIONS IN SEX ESTIMATION: Uplifting Trans and Gender Diverse Identities in Forensic Anthropology

A forensic anthropologist's job is often to ascribe identity when faced only with biological reality. The human condition posits that our biologies and identities interact in complex and unique ways, illustrating the myriad of variation and diversity amongst our species, including cultural, individual self-identity, and biological diversity. A forensic anthropologist, when faced with unidentified human remains, must build a biological profile, to identify how this individual may have been perceived in life. The goal is that these estimations can reflect the decedent's characteristics and start the process of identification. The facets of this biological profile: ancestry, sex, stature, and age, are estimations and clearly do not always reflect the identity of the individual, most importantly in sex estimation. Nowhere is this more pertinent than in cases of gender-diverse unidentified individuals, who have likely already faced adversity and heightened risk in life and face potential misidentification and discrimination in death. It is our duty to respect and uplift these individuals' identities to the best of our ability, whether that be adjusting our processes of sex estimation and personal biases, as well as continue to ask ourselves (and each other) how gender and sex manifest in humans and whether revealing this is necessary in the realms of identification.

The rift between the previously presumed synonymous sex and gender has been well documented but continues to draw interest and impact the society around us. Sex, in a biological sense, describes the hormonal, chromosomal, and morphological appearance of sexual dimorphism amongst humans. Colloquially, sex has been categorized into two binary identifications (male/female); however, the scientific community at large supports the fact that

these sex differences lie on a spectrum, resulting in many different assortments of sex characteristics. For so long, sex has been conflated with gender, as that binary sex identification is translated by the socializers in a child's life into expressions of masculine and feminine, causing the child to internalize and associate with a certain gender identity. Though this social association between sex and gender is fostered by the social control agents, it is not definitive, and many individuals (old and young) find that their gender identity and the biological sex which they were ascribed do not match. Gender diversity encompasses the existence of those who do not exist within our traditional binary categories of gender/sex and are thus referred to as transgender, gender nonconforming, or non-binary.

Forensic anthropologists are not necessarily concerned with objective truth, rather making estimations based on the skeletal material with the goal of identification, which can vary on a case-by-case basis. We must work within the categories available to make these identifications, based off the data we discern from the skeletal material. Once remains have been noted as being osseous and human, forensic anthropologist establishes a biological profile of four phenotypic factors through analysis. However, these factors are not mutually exclusive, and sometimes exist as parameters for the other factors. Estimation of biological sex is one of these factors, often being the first to be explored. The categories utilized in sex estimation exist on a 5-point spectrum ranging from gracile to robust, which is translated to female to male, with inconclusive occupying the median. The characteristics that inform this estimation are gleaned, primarily, from the crania and pelvis (though long bones can be used) via morphological and metric methods.

For this research, I seek to explore the methods employed in forensic anthropology for sex estimation, and wager whether these methods are able to grasp the complexity of the human

sex continuum, to arrive at a conclusion on the necessity of integrating queer perspectives in this field. This research question is propelled by a passion for trans activism and inclusion in forensic anthropology, so that we may better uplift and support this community by matching our identifications to personal identity. The trans community is a vital demographic in forensics given the disproportionate rates of violence, hate, and discrimination they've faced historically and currently. In a constantly evolving world, a field concerned with the identities of modern humans must be willing and able to readjust itself to reflect the diversity of the society it is serving.

Section 1: Sex and Gender

Defining sex and gender can be a difficult task to accomplish but is necessary when exploring the topics in research or scientific writing. Sex and gender are not synonymous, and most people (even outside of academia) do not use the terms interchangeably (Pryzgoda & Chrisler, 2000). Rather, most people tend to correlate sex with biology and gender with social and cultural forces. Even though this distinction is present socially, sex and gender are not mutually exclusive, and can impact one another as well as vary across individuals. Language cannot always encapsulate how gender operates, in tandem with or regardless of sex. This explains why it is integral that authors in academia define their interpretations of sex and gender in the context of their work, to better address the scope of the project, and establish a framework of how sex and gender will be explored in accordance with their research. As an introduction as we explore these concepts more intimately, I will define sex and gender (and associated terms) as they exist in academic literature.

Sex is the set of biological characteristics that influence a biological sex assignment at birth (most often male/female, though deviation from these terms is possible). Gender, on the

other hand, refers to the roles, characteristics, and behaviors that have been associated with certain gender expressions, such as masculine and feminine, overtime. However, what does it mean to separate these ideas, and imply that one precedes the other? One such side effect is the assumption that sex is "natural" and without influence from society. Gender may be socially constructed, but so is sex. Some academics, such as Christine Delphy (1993), might posit that biology *itself* is socially influenced, as it is society's attempt at using tools to understand our own bodies and physical processes. If that is the case, then we cannot assume sex is the sole contributor to gender, as gender can contribute to sex.

Neither category, sex nor gender, are binary, even though social norms tend to paint them this way. Humans can exist across each spectrum in differing ways, creating more web-like interactions and presentations than binary. When a person does not feel as if their gender correlates to their assigned sex at birth, they can be described as "transgender". This umbrella term includes many different identities, including people who present in a more binary expression (masculine and feminine) and people who present more mutably or outside of our expectations for binary expression. Those who don't ascribe to that division are often described as non-binary or genderqueer, and their gender (or absence of gender) can manifest in many ways as well as change over time. People under this umbrella may socially transition but may also seek out medical transition through lifesaving interventions, such as hormone replacement therapy, facial feminization/masculinization surgery, and gender confirmation surgery. If the individual has gender dysphoria (described as the distress from the dissonance between body and mind in terms of gender), these medical interventions can help treat dysphoria and help match one's gender expression to their identity.

Trans, non-binary, or gender diverse identities are not new by any means, and humans have existed outside of the gender binary for centuries, across cultures. Many cultures have specific terminology and roles dedicated to gender diverse people, such as two-spirit in certain Native American cultures (like the Diné). They were viewed as gifted and would hold positions of leadership in ceremonial practices, be caretakers and medical doctors, as well as aid in teaching economical skills (Shepard & Mayo, 2013). Outside of the Americas, we see gender diverse identities in the *serrers* of Kenya, *xaniths* in Oman, and Hjira in South Asia (such as India and Bangladesh) (Khan et al., 2009, p. 1). In the US, due to movements propelled by the Stonewall Riots, as well as better representation in media and online spaces, social norms are changing and making it slightly easier and safer to come out, but not nearly as safe and easy as it should be.

As Anne Fausto-Sterling says in "Why Sex is Not Binary": "Two sexes have never been enough to describe human variety" (2018). Sex is constantly evolving and shaping over one's life, from embryo to post-pubertal. Layers of biological presentations arise in differing ways, further differentiating us as humans. Because of this, sex is nearly impossible to distinguish definitively, as there is no "true" and universal meaning of sex, and meanings can differ amongst communities, generations, and individuals (Fausto-Sterling, 2018). As gender is concerned, the binary applies to expressions and behaviors we associate with how sex should be performed in society, whether that is connected to biological sex or not. Though the gender binary is influenced by the sex binary, it is not dependent on it. Given how vague and broad these supposed "binaries" are, we cannot use this dichotomous framework to describe and dictate how sex and gender operate. However, if we cannot use a binary framework, how else could we

frame these ideas? I'd posit that the answer is to view both sex and gender as a spectrum on a continuum.

Now that we've established how sex and gender exist on a continuum, we can better illustrate this through specifics. Sex cannot be defined by one measure, in fact, sex is a compilation of chromosomes, hormones, and genitals (Fausto-Sterling, 2018). This can be important from a forensic anthropological perspective since chromosomes and hormones (especially *in utero*) can impact the development of the bone, and thus secondary sex characteristics used for sex estimation. These, in conjunction, can affect how sexual dimorphism (difference of sex within species) presents in individuals across the spectrum. People who exist outside of the sex binary, meaning they may have diverse chromosomes, hormones, and/or genitals, are referred to as "intersex". In a medical context, many doctors and medical professionals will view ambiguous genitals or other intersex qualities as a medical issue, when there is no medical risk posed in most cases. Many doctors will perform sex assignment surgeries to infants and prescribe hormones and other care to re-affirm that assignment choice. Often, this decision is related mostly to phallus size (Kitzinger, 1999). This highlights the obvious influence of gender norms, misogyny, and societal impact in assigning sex. In this case, gender influence would precede sex assignment, uprooting the narrative that sex precedes gender and is without influence from societal and cultural forces. Intersex people sometimes have a more ambiguous gender identity or gender expression, but they also sometimes identify with binary gender (i.e., man and woman). This, of course, depends on the individual.

However, there are people who are not intersex and whose gender does not fall on the binary of masculine to feminine presentation, these people are referred to as non-binary or genderqueer. Non-binary is a broad umbrella term, and can describe a multitude of differing

ideas about gender identity (from absence of a gender to changing genders, etc.) (Richards et al., 2016). In addition to that, a person can express gender differently overtime, "A person's expression is not necessarily static and may be performed differently depending upon a variety of factors, including environmental context, comfort, and safety concerns" (Garofalo & Garvin, 2020). The word genderqueer arose in the 1990s to describe people "who share dis-identification with gender binaries" (Monro, 2019). The existence of these identities helps refute the binary's position in both biology and society.

Biological anthropology and cultural/social anthropology can occupy rather drastically different spaces, and sometimes fail to see the effects they have on one another. For example, social anthropologists may fail to understand how biology effects culture, and thus biological anthropologists may fail to apply socio-political frameworks to their work, therefore, "Sociocultural anthropologists have arguably been too introspective; biological anthropologists have not been reflexive enough" (Jones, 2014, p. 1). However, having a multidisciplinary approach is integral to being a good anthropologist and seeing things from a more broad and worldly perspective. In the case of gender diversity, and its impact on forensic identification, combining literature, knowledge and research around sex and gender in a cultural perspective with methods, beliefs, and practices in forensic anthropology, we can bridge the gap between biological and social perspectives. This way, we can offer a more nuanced, respectful, and understanding approach to identifying trans and non-binary individuals. Anthropologists have the potential to use their own knowledge to assist in this goal as, "…archaeologists' (and bioarchaeologists') identification of different ways to be human is crucial for debunking the universality and timelessness of binary models about socio-sexual lives" (Geller, 2019). It should be our prerogative to dismantle binary assumptions and practices within this field.

Section 2: Considerations When Applying Sex and Gender to Forensic Anthropology

Historical Influences

An academic cannot be blind to the genesis of their field. From medicine to cultural studies, strides have been made without paying acknowledgement to the Black, Indigenous, and People of Color who were used to acquire this knowledge without adequate representation or consent. In addition, the collection of data from these communities was unethical, violent, and exploitative, and the application of that data reinforced racist, sexist, and xenophobic ideologies. This is especially true for anthropology, particularly physical anthropology, whose origins draw on offering "justifications for social inequality" (Blakey, 1987, p. 9). Ales Hrdlička, who founded both the *American Journal for Physical Anthropology* and the American Association of Physical Anthropology, was a proponent of eugenics, white supremacy and scientific racism and used his knowledge to justify acts of discrimination and inequality (Blakey, 1987, p. 10-3). Another early physical anthropologist, Franz Boas, was a vocal opponent of scientific racism, and, along with his student Ruth Benedict, offered a resolution to the American Anthropological Association (AAA) against the practice in 1938 (Blakey, 1987, p. 24). In the near century that's passed since that resolution, several advancements have been made to atone for our field's dark past, such as NAGPRA (Native American Graves Protection and Repatriation Act) in 1990, which pivots our goals towards repatriation and protection rather than the exploitive techniques used against indigenous people in the past.

Beliefs held by these early physical anthropologists were largely bio-deterministic: the idea that certain characteristics are present in-utero and/or are determined by genetics. Blakely (2021) suggests that bio-deterministic ideas have translated into the 21st century under other forms and names. A bio-deterministic framework has often been used by people engaging in

transphobia and rejecting gender variance. Thus, we must avoid bio-determinism in all regards, from race to sex/gender. We must give weight to the multitude of intertwining factors that influence human variety, both biology and beyond. Acknowledgement of the mistakes made in the past to better uplift and represent marginalized people today is of utmost importance to anthropology. Blakey says of anthropologists, "…if they are to understand the meaning of their own work, must seek to understand the socio-political influences and applications of their chosen perspectives and analyses" (Blakey, 1987, p. 30), that they are both, "…tools of society and political actors" (p. 30). Therefore, we must apply an activist mindset to all areas of the field, so that we may serve those who need representation, closure, and attention and are often overlooked in societal structure.

The influence of historical events is not localized to specific discipline, extenuating circumstances have direct impacts in forensic anthropology's skeletal record. By creating a biological profile (or genetic) we are attempting to provide enough information to the public so that any family members, friends, or other related people can make the connection and help in identification. This is especially difficult in cases of unidentified, gender-diverse people from the 80s and early 90s, whose social networks were torn apart by the AIDs epidemic. The first case of HIV/AIDS was discovered in 1981, from which the epidemic increased throughout the 80s, peaked in the early 90s, and has since begun to decline ("HIV and AIDS", n.d.). By December 31, 2000, 448,060 had died from the virus ("HIV and AIDS", n.d.). In Queer culture, chosen family is a fundamental factor of social groups, since many Queer people do not have supportive biological families. During the AIDS epidemic, these families were torn apart, and the queer community at large lost so many lives it was devastating on both an individual and structural level. In addition to that, this was prior to the introduction of social media and electronic trails of

relationships, so it became much harder to identify found family ties. Attempting to find the next of kin or any close relationships the decedent had is made difficult by the sheer loss of life.

Following the impacts of the AIDs epidemic and strides made throughout the 1980s, the queer community saw an explosion of activism via academia in the 1990s. One of the most important scholars within queer theory, especially as it applies to this research, is Judith Butler. Butler was instrumental in bridging culture and biology regarding their impact on sex and gender. Butler does not dispute the idea of the "materiality" of the human body, rather argues that bodies are never without the influence of gender, and our self-identities of gender come after society's gendered influence (Watson, 2005). In other words, Butler has said, "…we have to consider the body as something that not only occupied specific sites and places, but something that is also in time, temporalised. It is impinged upon, for instance, by social norms…" (Reddy & Butler, 2004). This combination of social influence of gender, and the material reality of bodies, shows how the lines between sex and gender are not clear or distinguished, rather quite blurred. Butler posits that we can combat these ideas through "reverse-discourses", that by exposing heteronormative society to queer identities, we can dismantle the assumption of "original gender" or expected heterosexuality (Watson, 2005).

Today, with the fact that it is safer and easier to come out as gender diverse now than in the past (Dubov & Fraenkel, 2018), Queer people, and thus their found families, are easier found both in the physical realm and the online realm. Even so, chosen/found families are still important to this day, and should be considered when making forensic identifications in contemporary cases. When looking into older cases, we must be subjective when trying to discover whether a decedent was LGBTQ+ or not, media around the case at the time may have clues that unfortunately use regressive and harmful terminology ("A Message to Citizen Sleuth

Allies", 2021). Understanding the evolution of acceptance and activism for marginalized communities' overtime is essential when covering or working on cases from the past. This is exemplified by Watson (2005) who states that, "Queer theory in the academy has since traversed every disciplinary boundary from history, science, literature, sport, music, etc. by subjecting texts and 'discourses' to a range of queer strategies" (69). By continuing this dispersion of queer theory as it applies to forensic anthropology, we are further expanding the bounds of queer theory's influence.

Ethical Considerations

It is crucial that, when undertaking any research involving minority communities, that we outline ethical considerations. Adams et al. (2017, p. 165) provides these nine criteria for engaging in research on transgender communities:

> (1) Whenever possible, research should be grounded, from inception to dissemination, in a meaningful collaboration with community stakeholders; (2) language and framing of transgender health research should be non-stigmatizing; (3) research should be disseminated back to the community; (4) the diversity of the transgender and gender diverse (TGGD) community should be accurately reflected and sensitively reflected; (5) informed consent must be meaningful, without coercion or undue influence; (6) the protection of participant confidentiality should be paramount; (7) alternative consent procedures should be considered for TGGD minors; (8) research should align with current professional standards that refute conversion, reorientation, or reparative therapy; and (9) IRBs should guard against the temptation to avoid, limit, or delay research on this subject.

Of this list, numbers 2, 3, 4, 8, and 9 are of particular importance to this research, but all are indispensable. In session five of the conference *Transcending Jane and John Doe: The Impact of Gender Identification in Forensic Cold Cases* (2021), panelists Mari Isa, Taylor Flaherty, and Amy Michael posit that anthropologists have "an increased burden of ethical responsibility when working with marginalized communities". They outline four main responsibilities

anthropologists should have when working these cases: to acknowledge the inadequacies of the binary, apply harm reduction principles, collaborate towards best practices, and recognize role as potentially adding to harm and having bias. With application of these criteria and ideals, we can better frame casework to uplift gender diverse groups with respect.

Data and Statistics

Violence against gender diverse people is unfortunately long-standing and is a vital component to the hinderance of trans and gender diverse cases in forensic anthropology. Given that this community faces disproportionate rates of violence, abuse, and homicide makes it of special significance from a forensic perspective. When assessing these rates, it's important to note the differing sources: self-reporting, hotline calls/social service, and police reports, all of which can dramatically differ depending on how the individual or bystanders wish to report. Unfortunately, these trends are not improving, after 44 deaths 2020 became the deadliest year for trans and gender non-conforming people since the Human Rights Campaign began keeping track in 2013 ("Fatal Violence Against the Transgender and Gender Non-Conforming Community in 2021", 2021). The gender public advocacy coalition (GPAC) has gathered data on 51 young, trans and non-binary folks who were murdered between 1995 and 2005 in the US (Wilchens & Taylor, 2006). Their demographic data illustrate how important intersectionality is in these conversations, as most victims were of lower socioeconomic status, were People of Color (91%) or were trans women (92%) (Stotzer 2009). While 69% of other homicides have been solved, only 46% percent of the Gender Public Advocacy Coalition's "50 under 30" (50 cases of murdered LGBTQ people under the age of 30 across a 10 year-span) have been solved (Wilchens

& Taylor, 2006). Given these data, forensic anthropologists should be concerned with these rates, and apply our knowledge to aiding in solving these cases.

A survey, conducted by Tallman et al (2021)., found that out of 128 participants (all practicing forensic anthropologists) only 28.9% had worked a case involving a trans or gender non-conforming decedent. Perhaps, this percentage will rise as we progress through the 21st century, since trans identities are becoming more societally accepted and represented in the media. Due to this, more and more people are receiving HRT (hormone replacement therapy), GCS (gender confirmation surgery), or FFS/FMS (facial feminization/masculinization surgery). Hormone therapy has been around since the 1960s to treat a variety of factors and rose in popularity in the 1990s (Cagnacci & Venier, 2019) a trend that has remained steady. Rates of FFS have been rising as well, a 2021 study found a "13.6-fold increase" in FFS surgeries within a cohort from 2013-2018 (Chaya et al.). A recent study from 2017 found that 25% of their participants had received GCS (Kailas, 2017). The "rising prevalence and acceptance" of gender diversity has allowed for rates of GCS, HRT, and other medical interventions to grow (DuBov & Fraenkel, 2018). However, a National Center for Transgender Equality (NCTE) survey, involving 27,715 participants, discovered only 49% had transitioned medically, while 25% had transitioned surgically (James et al., 2016). These medical procedures and treatments are necessary and lifesaving, but unfortunately, are not as widely accessible as they should be. The lack of providers, stigma, discrimination, and cost barriers have made it difficult for people to access the lifesaving care they need; 55% of those seeking GCS were denied (James et al., 2016). As accessibility becomes broader, and rates continue to rise, these treatments, especially FFS and possibly HRT, will be more important as they apply to the skeletal record, as both have the potential to be recognizable when assessing remains.

Structural Vulnerability

Structural vulnerability is defined as, “an individual’s or a population groups’ condition of being at risk for certain negative health outcomes through their interface with socioeconomic, political, and cultural/normative hierarchies” (Bourgois et al., 2017) and that, “Patients are structurally vulnerable when their location in their society’s multiple overlapping and mutually reinforcing power hierarchies and institutional and policy-level statuses constrain their ability to access healthcare and pursue healthy lifestyles” (Bourgois et al., 2017). It is these combined factors that increase the risk for violence and/or death in trans communities, as their vulnerability is a product of an unjustly structured society. Intersectional activism, across all sectors, is fundamental in decreasing structural vulnerability. Recognizing structural vulnerability is essential to understanding how and why we see certain trends in forensic practice. In Session 5 of the *Transcending Jane and John Doe* conference, Isa, Michael, and Flaherty, analyzed why it is imperative that forensic anthropologists apply a structural vulnerability framework to the marginalized groups we work with, especially the trans/non-binary community (2021). From an intersectional perspective, when an individual has more than one marginalized identity, they are more likely to face oppression, discrimination, social erasure, and/or violence. This is especially the case with gender and non-binary folks, as Black trans women are at a much high risk of violence than other trans people. Isa, Michael, and Flaherty’s analysis of factors contributing to structural vulnerability in a forensic anthropological lens is of particular interest. They exhibit how social inequality, health disparities, and economic insecurity are all antemortem factors that make the trans community more structurally vulnerable in forensic anthropology, while perimortem factors include cause/manner of death, bias/inaccuracy in reporting, and overrepresentation in forensic cases. Postmortem factors like analytical limitations, continued

issues in reporting/documentation, and family relationships can impede on identification. By understanding structural vulnerability's role in overrepresenting queer people in the forensic context, we can better illustrate the imperative to address these cases.

Identity

An interesting line that forensic anthropologists must walk is that between how one might self-identify and how they may be identified in a social context. We can assess the biological factors of an individual and create a profile that may match how they were socially perceived in life. However, as we know, how someone self-identifies is not always in line with how they are socially perceived. Can forensic anthropologists discern anything about self-identity from the skeletal record? Besides the impact of FFS and hormones, which we will explore later, no. However, this is where looking at the context and circumstances of the scene is incredibly important. Many forensic anthropologists believe that looking at the circumstances of the case gives the observer a bias that prevents them from creating an accurate biological profile. Tallman and his colleagues found that only 36.4% of their respondents (forensic anthropologists) noted they would use scene context to identify a possible gender (2021). I would argue that ignoring the context of the scene entirely, creates bias and prevents identification since one may be more likely to misgender the individual. The Trans Doe Task Force (TDTF) offers that by looking at the circumstances, such as clothing, jewelry, or makeup, can better represent a person's self-identity ("A Message to Citizen Sleuths", 2021). In some cases, when trans and gender diverse folks go missing, unfortunately their families who aren't supportive, will report them missing under their deadname (name assigned at birth) or their sex assigned at birth. This can impact how we make an identification so we must be aware of it as forensic anthropologists. TDTF

recommends to not engage with disrespectful biological families but continue to circulate unsolved cases to the public. It is our job as forensic anthropologists to help identify folks whilst also uplifting their identities, so we must be aware of this. As Amy Michael said in an Atlantic article, trans people are, "…marginalized in life and in death" (Zhang, 2019). We, as forensic anthropologists, are responsible for ensuring dignity and respect in death in accordance with how they lived to prevent further misgendering or discrimination. Everyone deserves to be known in death how they wished to be known in life. Though gender cannot necessarily be identified from the skeletal record, use of context can play a vital role in uncovering a decedent's self-expression, and therefore, self-identity.

Section 3: Methodology

Biological Profile

Ideally, in a forensic case, an identification will be made via comparison of antemortem data to postmortem data, including dental records, fingerprints, and/or DNA (Austin & King, 2016). When this data is not available, a forensic anthropologist will create a biological profile based off both metric and morphological data. The biological profile includes ancestry, biological sex, stature, and age, as well as any individual characteristics that could aid in the identification process. Of these, sex estimation is usually performed first, as all other factors of the biological profile are sex specific (Messer & Getz, 2020). Forensic anthropologists must follow best practices and guidelines when conducting this work, as provided by the Organization of Scientific Area Committees for Forensic Science's Forensic Anthropology Subcommittee (within the National Institute of Standards and Technology). Prior to 2015, however, this group was referred to as the Scientific Working Group for Anthropology (SWG-ANTH) (Forensic Anthropology Subcommittee, 2014). They state that a valid sex estimation is dependent on

ancestry and age (SWG-ANTH, 2010), so comparative analysis is incredibly important. The morphological markers that distinguish how a sex estimation is made are influenced by sexual dimorphism. Sexual dimorphism refers to the physical differences noted between the different sexes in each species, which can vary in range. This most often takes the form of being more gracile or more robust in humans, though it's more complex than that. Sexual dimorphism begins to effect humans around the onset of puberty, in which hormones start to promote certain secondary sex characteristics (Berg, 2013). Height is the most dimorphic trait (Jantz & Ousley, 2020), though one could argue any different of size or shape is important in sexual dimorphism as the levels of dimorphic differences vary by which population group you are assessing.

Terminology

There are a plethora of terms used to describe the exploration of sex in the skeletal record. Sex *assessment* is utilized by SWG-ANTH in their guidelines. Assessment is used when utilizing morphological traits to make an assessment without, "…estimable error rates, classification rates, or any associated statistics" (Spradley & Jantz, 2011, p. 290). Sex *determination* implies that the assessor is nearly certain of the biological sex of the individual. Sex determination is utilized by the Defense POW/MIA Accounting Agency (DPAA) in their case reports and standard operation procedures (Klales, 2020). The certainty that the word "determination" conveys is unable to be acquired through the methods we currently have available in skeletal analysis. Besides the application of DNA analysis, one could argue we could never be certain enough on biological sex to make a "determination" and thus this word should be removed from the forensic lexicon. Sex *estimation* is used when applying metric analysis, accompanied with statistics and error rates (Spradley & Jantz, 2011). Though, given the fact that morphological data is still utilized by much of the field, and that neither morphological nor

metric can definitively decide the identification of biological sex, Klales posits that we should use sex estimation to describe all elements of estimating sex since it is just that, an estimation (Klales, 2020, xxxiv-xxxv).

Methods Used

As is the case with most scientific research, forensic anthropologists employ both quantitative and qualitative data analyses in their studies. The quantitative data used is metric and is based on measurements from various skeletal elements. Qualitative data includes, "nonmetric, morphological, morphoscopic, macromorphoscopic, and anthroscopic traits" (Klales, 2020, xxxii) which are often presented on a continuum or on a present/not present basis. To simplify, forensic anthropology uses both naked-eye comparison and metric statistical analyses to conclude all components of the biological profile. Klales (2013) states that, while morphological and other non-metric analyses used to be preferred, there has been a major shift in the last several years to support metric/statistical analyses instead. However, application of both practices is the strongest way to achieve accurate results. Most of the field considers the pelvis to be the strongest indicator of biological sex, followed by the skull and long bones (Spradley & Jantz, 2011). Klales's (2013) study found that 94.3% of practitioners ranked the pelvis as their top choice in estimating sex. This is likely due to the fact that the pelvis reflects a functional difference in dimorphism (differences in size and shape due to potential childbirth) rather than hormonal differences.

Morphological

From a visual aspect, the range of human sex differences can be illustrated through a scale of gracility to robusticity (Krishan et al., 2016, p. 165). The most well-known assessment of this range is the Phenice (1969) method, which is based on 275 individuals of known-sex,

within the Terry Collection (Ubelaker & Volk, 2002). Phenice (1969) focused on the three most important pelvis features for sex analyses: the ventral arc, subpubic concavity, and the medial aspect of the ischio-pubic ramus (Ubelaker & Volk, 2002), though other elements, like shape of obturator foramen and sacrum and size of acetabulum can be applied (Klales, 2020, p. 77-86). Through majority rule (all three traits must align with a certain sex distinction) Phenice claimed 95% accuracy of classification (Klales et al., 2012). From Phenice's work, other researchers like Buikstra & Ubelaker (1994) and Walker (2008) built stronger scoring guidelines and standards, most often using a five-point scale. For the skull, these five-point scores are focused on the glabella, orbit, mental, mastoid, and nuchal areas (Walker, 2008, p. 45), and were assessed using logistic discriminate functions (Garvin, 2020). However, it is important to emphasize the fact that the 5-point scale does not reflect feminine or masculine presentation, rather where on the spectrum of gracile-robust that the skeletal element falls. The correlation of these five points to female, male, and probable male/female supports the idea that these distinctions reflect those sex differences, and we should steer away from the "…assumption of 'maleness' (masculinity) or 'femaleness' (femininity)" (Klales et al., 2012).

Metric

The most common resource utilized by forensic anthropologists in metric analyses is FORDISC (Jantz & Ousley, 2005). Its interface allows the user to submit either post-cranial or cranial measurements (not simultaneously) in reference to certain reference populations to discover elements of the biological profile (sex must be determined with a known ancestry in FORDISC 3.0)(Berg, 2013, p. 155). The Forensic Anthropology Data Bank (FDB), which was conceived in 1986 and currently has about 3400 individuals (2400 of whom we have definite ancestry and sex) (Forensic Anthropology Data Bank) provides the base for which FORDISC 3.0

is built from. The two most common approaches to statistical analyses using FORDISC are logistic regression (LR) and discriminate function analysis (DFA), which are used in morphological and metric, respectively. Logistic regression (LR), "…calculates the probability that an individual belongs to a specific group (e.g., females or males), while DFA determines which group the unknown individual most likely belongs to, based on the overall similarity after maximizing group separation" (Klales et al., 2020, p. 203-217). As we know, variation in sex differences exists across communities and time. Unfortunately, FORDISC is not exactly representative of all populations as it applies to sex estimation. While FORDISC has sex-only functions for American Black and White populations, the continued misclassification of Hispanic populations has caused them to remove that sex-only function option (Jantz & Ousley, 2020), while Native American and East Asian population samples are too small to even determine sex.

Current Practices/Guidelines

Sex estimation is not independent of other factors within the biological profile and separate from it. SWG-ANTH (2010) supplies 4 factors that can influence sex differences in the skeleton: inter-population variation, intra-population variation, age and pathology/taphonomy. These four factors illustrate just how varied sex estimation can be amongst groups and individuals, and, therefore, we cannot assume any global universals. SWG-ANTH (2010) also provides the following best practices to employ when assessing sex estimation:

- Sex assessment should be made independently of suspected or presumptive identification to avoid bias.
- When appropriate, use population- and period-specific standards.
- Assess and measure the maximum number of age-appropriate cranial and postcranial variables, emphasizing the most dimorphic elements present, especially in the case of fragmentary remains.
- Document and describe the location of any inconsistent indicators.
- If an observation cannot be made or a measurement cannot be taken, explain its absence: missing, broken, fractured, congenital, pathological, or anomalous.

- Sex assessment, as well as assessments of other skeletal parameters, should be performed, even if samples for DNA analyses will be taken.
- Express degree of certainty when reporting sex assessments, especially when a sex assessment is less than certain, e.g. "male?"
- When an assessment of skeletal sex is not possible (e.g. partial remains or those of subadults), sex assessment by DNA analysis may be helpful.

They also propose two unacceptable practices: the estimation of gender or estimating sex with juvenile remains. With this information at hand, it is clear how establishment of guidelines and best practices allows for better standardized practice.

Section 4: Limitations in Current Methods and Practices

Overall, current approaches to sex estimation fail to encapsulate the complexities of the sex spectrum but also how culture and biology mutually influence the development of bone over time. Anne Fausto-Sterling, in her *The Bare Bones of Sex* piece, explores the idea that, "culture shapes bones" (2005, p. 1491), and proposes we "ask old questions in new ways so that we can think systematically about the interweaving of bodies and culture" (p. 1516). In line with Fausto-Sterling's criticism that we don't fully integrate culture's influence in biology, we must recognize the "EuroAmerican and androcentric" (Jones, 2014, p. 18) ideas that infiltrate our understandings of sex differences, like the association of gracility/robusticity to "maleness/femaleness". To combat this, Jones suggests we continue to integrate feminist and queer theory into forensic anthropology and, "see 'sex' as a culturally constructed category" (p. 19). Jones (2014, p. 47) also posits seven aspects of sex estimation that limit our conception of how sex operates in the skeletal record and socio-cultural setting:

> 1) it is assumed that sex is binary; 2) it is assumed sex is stable; 3) it is assumed that sex is a given fact, rather than a social construction; 4) it is ideologically presupposed that being female is a deviation or pathological condition; 5) sex is reducible to reproductive processes; 6) it is lacking any consideration for cultural context; and 7) age related changes are not taken into consideration.

Is this perhaps influenced by our lack of queer representation in the mainstream archaeological record? Pamela Geller calls for an, "end to commonsensical presumptions about socio-sexual lives as framed by dichotomy rather than diversity" as well as for anthropologists to, "initiate dialogue and research about gender variance in their studies, carefully communicate their finds in both popular and scholarly forums, and not shy away from the political ramifications" (Geller, 2019, p. 240). Through this, we can rid the field of heteronormative assumptions, and better represent queer culture in our research.

To connect the estimation of biological sex from skeletal record to other parameters of sex, DNA analysis can be used. The collection of DNA, when soft tissue is not available, relies on a hierarchy: as the teeth are the strongest element (due to enamel and strength to last overtime) and long bones can be preferred for their compact bone availability (Thomas, 2020, p. 344). The chosen bone for sampling is then photographed, cleaned, cut, and ground to a powder for processing (Thomas, 2020, p. 345). Though DNA is a strong indicator of sex, it must be noted that chromosomes aren't the only component of the biological influences that make up sex. When paired with skeletal analysis, we can get a better picture of biological sex independent of gender. It can also be used when, "…sex estimation based on morphological or metric analysis was not possible, such as juvenile remains and partial remains" (Thomas, 2020, p. 346). Accuracy rates, regarding sex estimation, are contingent on the level of completeness of the skeletal elements available. Thomas et al. (2016) explores accuracy as it applies to 360 cases from the FBI Laboratory in Quantico, VA, by comparing DNA to sex estimations. They found an overall rate of 94.7%, though it shifted as low as 60% and as high as 97.8% depending on how complete the skeleton is (Thomas et al., 2016, p. 1308). This illustrates how DNA can be a vitally important asset in comparative analyses against previous assumptions of sex.

Ensuring accuracy is important, as stated previously, since aspects of the biological profile (ancestry, notably) are sex specific. Most importantly, we cannot assume sex or gender confidently from any measure of estimation, as we cannot speak with the decedent to confirm this information. The parameters that are established for sex estimation are not binary and the spectrum is not equally balanced in terms of variation. In addition, depending on a sex estimation as evident of the descendant's social expression in life can be damaging, and negatively impact chances for identification. Forensic artist recreations using estimated biological sex rather than circumstances of recovery noting a different gender expression represent an image that may not correlate with how the decedent appeared in life. In cases where the decedent may be trans or gender-diverse, the case may benefit from another forensic artistic recreation that represents the gender presentation that correlates with their clothing and accessories. One such case that may benefit from this is that of "Gilgo Beach Doe" who was of Asian ancestry, 17-23 years old at the time of their death, and was discovered in New York on April 4, 2011 (NamUs #UP9355, 2011). Their biological sex was estimated to be male, however, they were found with women's clothing (DoeNetwork). The only forensic recreation currently available to the public pictures a masculine expression (NamUs #UP9355, 2011), which may not be reflective of the decedent's identity, and therefore, wouldn't be recognizable to those who knew them.

The ability to apply previous experience, knowledge, and memories to pertinent situations is a built-in function of the human condition. Though these processes are meant to ease cognition and quicken decisions, they can introduce an element of bias that impedes, "data processing, causing judgment and decision-making to be unreliable" (Nakhaeizadeh et al., 2020, p. 329). As it applies to forensic science, Nakhaeizadeh et al. (ibid.) explains that "situational context, early hypothesis, and expectations" (2020, p. 330) can influence conclusions made later.

Cognitive bias is clearly a major influence in forensic anthropology decision-making. Another study by Nakhaeizadeh et al. (2014) organized three groups of forensic anthropologists and had them estimate biological profile with and without context. The control group found 31% to be female, while 69% were male, while the experimental group without context found 72% to be male, 14% to be female, and 14% to be undetermined (p. 213). The experimental group with context, however, found 100% of the remains assessed to be female (p. 213), exhibiting the extent that bias can paint decisions. Bias has a greater level of influence when the remains found are partial or ambiguous. Separating bias derived from context from forensic case work is challenging to say the least. As a "high-context" profession (Nakhaeizadeh et al., 2020, 335), forensic anthropologists are constantly exposed to circumstances and information from the site, through physical assistance in recovery or communication with other forensic fields (like pathology, etc.). The influence of bias is evident in the case of Julie Doe, who was discovered September 1988 in Florida, and is the first case that the Trans Doe Task Force took on (Zhang, 2019). At the time of her recovery, she was estimated to be female, due to evidence of pitting and ridges in her pelvis implying she had given birth over the course of her life (Naves, 2022). Though, it's also likely the context of her recovery also influenced this estimation, as she was discovered with women's clothes and accessories, as well as breast implants (Zhang, 2019). It wasn't until 2015 that DNA testing showed she had XY chromosomes, and the pitting was likely due to hormonal therapy (Tdtf, 2021). Though complete removal of bias from forensic decision-making is likely not possible, a strong course of action would be to promote awareness of cognitive bias and its implications in practice.

It is crucial to note that gender-affirming care is not specific to trans communities, as we've seen HRT used to treat hormonal imbalances, and procedures like rhinoplasty and breast

augmentation are common in general. The combination of evidence indicating these treatments, with sex estimation and scene context, can better illustrate whether someone was trans or non-binary. Though relatively contemporary, several studies are emerging which explore the evidence of FFS or HRT in the skeletal record. FFS usually includes "hairline lowering surgery, forehead reduction and contouring, brow lift (browplasty), rhinoplasty (nasal bone surgery), cheek enhancement (augmentation and reduction), lip lift and lip filling, chin contouring (genioplasty), jaw contouring, and tracheal shave (Adam's Apple reduction)" (Schall et al., 2020, p. 2). There are five cranial elements that tend to illustrate the most sexual dimorphism: these being the "glabella, nuchal crest, supraorbital margin, mastoid process, and mental eminence" (Tallman et al., 2021, p. 4). Tallman et al. (ibid.) point to the glabella, mental eminence, and gonial angles as being potentially impacted by FFS, though there is not enough research yet as to the extent to which this is true (2021, p. 4). One study currently available was conducted by Shelby Buchanan (2014) who used the same tools utilized in FFS procedures (such as an oscillating blade and a dome-shaped dental burr) on a set of pig skulls, both wet and dry, to analyze whether the tool-marks could be picked up in skeletal analysis. She found that there was evidence of these marks being discernable in the skeletal record, though identification of the exact tool used may be unlikely (ibid., p. 62). In addition, in real-world application the bone would begin healing after surgery.

HRT is usually the first step in the transition process for many people (Tallman et al., 2021), and developmental changes can vary depending on the individual, levels/types of hormones, and at what point in life the hormones were started. Studies assessing the amount of influence hormones have in the skeletal record are in their infancy, with many studies needing to be longitudinal (take place over a period of time). One study currently published by Schagen et

al. (2020), regarding adolescents undergoing hormonal therapy, found that bone mineral apparent density decreased during gonadotropin-releasing hormone analogue treatment and increased during gender-affirming hormone treatment. As more research becomes available regarding the influence of hormone treatment on bone development, it is important that we remain informed and aware of this intersection of culture and biology.

Putting aside the influence of FFS and HRT on skeletal composition, analysis of the site is one of the only other options to discern gender from the context. Though it can potentially add bias, looking into types of clothing, jewelry, or accessories after estimating sex may provide a better interpretation of how the decedent identified themselves. One such example is that of Dane County Doe who was found in Madison, WI on September 3, 1989, within the chimney of a music store with an estimated post-mortem interval of 2 months to 2 years (DNA Doe Project, 2021). Their sex was estimated to be male, however, they were found with women's clothing and jewelry, and therefore, may have potentially been gender diverse. Their death was ruled to be a homicide, and it's very likely a hate crime had taken place. They were added to the DNA Doe Project's pending cases in December 2021. Though the genetic testing will hopefully bring closure, this case joins that of Gilgo Beach Doe as one that could benefit from another artistic recreation that better represents their expression.

The rigid categories currently employed in forensic research are not an adequate representation of the biological sex continuum and fail to exhibit how culture influences biology. Though complete erasure of sex estimation from the biological profile is unlikely, there are other options we can utilize to disestablish the binary presumptions we have about sex in forensic anthropology. One such option, explored in Bartholdy et al. (2020) proposes we use LogR (logistic regression) over discriminant function analysis (DFA), given the broader range of

flexibility LogR allows, compared to the rigid cutoff points DFA employs. Tallman and his colleagues propose we focus on, "…incorporating contextual evidence (e.g., material evidence, clothing, scene information, signs of surgery); utilizing multiple indicators of sex, including the cranium, and not prioritizing pelvic data; …using more nuanced reporting terminology for sex estimations; and expanding forensic sex estimation categories" (2021, p. 17). To summarize, it is important we recognize that, "Our skeletons are part of a life process" (Fausto-Sterling, 2005, p. 1516), and application of this fact in the field is essential for future study.

Section 5: Future Directions and Conclusions

As it stands, most forensic anthropologists have not had experience working on cases in which the decedent was trans or non-binary. Tallman and his colleagues surveyed 128 forensic anthropologists with varying degrees of experience and found that only 28.9% had worked on a case involving a trans or non-binary person (2021, p. 7). Of those who responded yes, only 41.7% of them had reported this in official casework. However, this number shifted to 72% when asked if they'd report this finding in future casework, showing schools of thought shifting as we progress into the future. More specifically, when asked about FFS, 47.8% of participants noted they were unfamiliar with how these procedures impact the skeleton, and 71.2% had never encountered evidence of FFS in their casework (Tallman et al., 2021, p. 8). Another study, asking the same question, by Buchanan (2014) found that 91% of respondents hadn't come across marks associated with FFS (p. 51). If this information is representative of the trajectory of the field, we can assume the percentage of those without experience with FFS will continue to decrease. We must advocate for casework that is representative of the trends we see in the community, to remove ourselves from ethnocentrism and inherent heteronormativity.

The Trans Doe Task Force became an official non-profit organization in 2021 and has since been aiding in uplifting and solving cases involving trans or non-binary people. Through the education of law enforcement, medical professionals, and forensic anthropologists, TDTF is disseminating valuable knowledge to the medicolegal community, so they are equipped to work these cases. They also have a forensic genetic genealogy team (Redgrave Research Forensic Services) ran by Anthony Redgrave and Lee Bingham Redgrave. Their work has been instrumental in bringing closure to the unidentified decedents in the trans community. LAMMP (LGBT+ Accountability for Missing and Murdered Persons) was created by TDTF with the goal of having a database of missing and murdered persons within the LGBT+ community. The LAMMP database has an open submission form which allows members from the public who have extra time on their hands to submit cases from NamUs or other databases, which they believe may be gender diverse or LGBTQ+. The database itself is private and requires special permission to access. However, the curators at LAMMP have created a case map (available to the public), detailing all the possible cases of trans or gender-diverse people across the US and in a handful of other countries.

TDTF's first conference took place in April 2021 and was titled *Transcending Jane and John Doe: The Impact of Gender Identification in Forensic Cold Cases* and included seven sessions led by various anthropologists and forensic genetic genealogists associated with TDTF. In session 5 of the conference, Isa, Flaherty, and Michael propose several techniques (for both pre- and post-identification) aimed to reduce harm to the trans community (2021):

Pre-identification
- Perform blind analyses of sex estimation to avoid bias
- Discuss limitations of sex estimation in case reports
- Include gendered context clues in case reports
- Use inclusive, accurate language and avoid gendered language in case reports and communications

- Discuss challenges of identifying trans decedents with law enforcement, medicolegal professionals.
- Avoid approaches that use a rigid checklist to evaluate cases

Post-identification

- Be prepared to discuss the importance of chosen name
- Advocate for investigation beyond deadname
- When there is compelling evidence to back a lived identity, respect that identity in communications about the case
- Ask for and accept assistance from the Trans community members and informed advocates during the investigation process

Championing the implementation of these techniques, universally, would promote better practices and ultimately increase likelihood for identification.

Applying these techniques and approaches to forensic casework should be universal amongst forensic anthropologists, as it will lead to more just and respectful estimations of identity. As we continue to progress into this century, we will, hopefully, see stronger support of the trans and non-binary community, and thus more research aimed at making their lives easier. As more studies regarding the developmental impact of HRT are released, along with further explorations of FFS, we will be able to better conceptualize how gender may be represented in a forensic context. This can be achieved through un-biased sex estimation (without site context) followed by application of site assessment. Until then, our goal for identification must be to reunite one's self-identity with their remains. For many trans and gender-diverse individuals, they had to advocate for their own identities their whole life, and it should be our utmost prerogative to advocate for that chosen identity on their behalf. Through application of queer perspectives and activism to forensic anthropology, we can nullify the binary modes of thinking that inform our identifications, and better serve the trans and gender-diverse community.

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