

***The Technology of Classical Instruments:
Do Artifacts Embody Gender Biases Through Construction and Design?***

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Extended Abstract:

Understanding social values and politics through the design of cultural objects has been a hotly contested debate among social scientists and political theorists (Winner, L., 1986 & Werskey, G., 2007). According to the theory of technological politics, certain technologies not only become the methods of settling issues within communities, but also, embody political phenomena and social values in their own right (Winner, L., 1986). Therefore, through the examination of the engineering and design of artifacts, one could theoretically gain a greater understanding of gender, gender roles, gender expectations and gender inequalities within a society.

To test Winner's hypothesis, this project examined the design of two classical musical instruments, the piano and the cello. This study aimed to determine if the instruments were in themselves gendered and demonstrative of a Western patriarchal culture. Through content analysis, instrument size, proper playing position, necessary hand span and common instrument related injuries were compared to previously collected data on men and women's average height (CDC, 2004), anatomy, hand span (Steinbuhler, D., 2006) and clothing restrictions (Lowe, J. & Lowe, E., 1982).

The evidence produced in this study suggested a strong correlation between the most common challenges of female pianists and cellists and instrumental design. In addition, instrument modifications, designed to eliminate some of the arduous conditions faced by many female players, became more common beginning in the 1970s (Steinbuhler, D., 2006), the peak years of the second wave feminist revolution. Therefore, it can be concluded that, to an extent, certain classical instruments embody the gender biases of Western society. One could argue that by their design and construction, the piano and cello illustrate the historical preference for men within the public sphere, the asymmetry between men and women among the artistic elite and the slowly changing, but still present, gender inequalities in contemporary Western society.

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In his article “The Marxist Critique of Capitalist Science: A History in Three Movements,” Gary Werskey states that if we explore the history of technology from a Marxist ontology then “history is the motor of technology [and] technology is the embodiment of values in artifacts.” This point was especially striking from a sociological perspective.

Sociologists are generally trained to abstain from attributing human qualities to objects. Social scientists label the process of ascribing human characteristics to articles as reification. The danger of reifying objects is generally tied to fears of failing to see world as a social construction and disregarding the possibility of social change.

In contrast to sociological tradition, Langdon Winner, a political theorist and professor of Science and Technology Studies (STS), explores objects and technology from a “theory of technological politics.” Winner argues that if one takes the reification standpoint literally, it would imply that technical things do not matter. Instead, he suggests that certain technologies have political phenomena within themselves and embody specific forms of authority and power. These technical politics not only draw attention to the intertwining of politics and technology, but also makes one aware of the impact technical arrangements have on social order. In other words, technology, engineering and design advance the interests of only certain members of a society.

A “theory of technological politics” provides an excellent starting point for questions related to STS. Who benefits from technology, engineering and design? Who is subordinated by technical arrangements? What can be understood about society through the study of technology? What politics, social values, norms, biases and inequalities can be explored through a study of technology? However, these are not only questions for the scientist and STS theorist to answer; they are rudimentary lines of inquiry essential for every member of society.

The purpose of this project will be to attempt to apply Winner’s “theory of technological politics” to societal values. This project will explore the possibility that many artifacts are

designed to continue a tradition of patriarchy and the subordination of women and therefore, these objects themselves produce and reproduce a patriarchal society. To examine these proposals, this project will focus on the technology and engineering of two classical instruments. While it is important to remember that classical instruments also embed racial and class-based values, this paper will focus specifically on sex differentiations and sex discrimination.

The modern piano was invented around 1700 in Florence, Italy. As the instrument became more popular, and available to a larger number of elite and upper-middle class people, the favored style of music transitioned from classical to romantic. The piano was a preferred instrument of the Romantic era (1850-1900). The piano music of this period was characterized by dramatic, lush, theatrical sounds that utilized the entire keyboard.

While both men and women have historically played the piano, gender expectations have constantly influenced when and where a person would perform. Men dominated the public sphere, while women generally played within the home, giving parlor concerts for family and friends. Gender norms and the fashion styles of the time greatly impacted the various avenues available to a pianist. However, even more constraining, even today, is the technical design of the piano.

One of the most challenging physical requirements for piano playing is having an appropriate hand span. According to research presented at the Music Teachers National Association conference in 2004, the average hand span for an adult woman is 7.7 inches. This can be problematic in many compositions, which require a player's hand span to cover a tenth. On a standard keyboard a tenth measures over eight inches.

A second instrument design that is challenging for women and players with a smaller physical build is the cello. The proper placement of the cello requires the top of the instrument to rest against the chest. For women, this can be uncomfortable, especially if a woman has sensitive breasts or is lactating. As the instrument is held between the legs, gendered fashion styles and expectation impacted who typically played the cello in the public sphere.

Again, hand span becomes an issue for women who wish to play the instrument. Specific notes are produced, in part, by the position of the first, second, third and pinkie finger. Individuals with longer fingers have an advantage at cello playing. If one returns to the research on hand span presented in 2004, it becomes clear that there is almost a dimorphic separation between the average hand span and finger length of men and women.

Despite these limitations, the developers of modern technology have created means of making musical instruments more suitable to women, children and men with smaller physical bodies. If one believes human ends are transformed as they adapt to technical means, these new developments could be interpreted as a signal of changing gender biases. Special sized piano keyboards can be ordered and inserted into a piano. Cellos can be ordered in a wide range of sizes, with many female cellists opting to play 7/8 sized models. Individual musician also find a variety of methods to overcome physical limitation. Many pianists play chords as an arpeggio, striking notes in quick succession, rather than together as a block sound. Cellists spend time focused on finger agility, flexibility and strength and also create innovative fingerings that sometimes include temporarily using the thumb. It is also important to note that modern fashion has enabled women more access to many instruments.

These modifications, however, can be difficult to achieve. Specialized keyboards can cost between \$5,000 and \$10,000. These keyboards are difficult to install, and therefore, cannot be used in every piano on which a performer might have to play. Cellos sized for smaller players produce slightly different acoustical resonance. Some musicians, critics and instrument makers have critiqued the slight difference in sound produced by a smaller cello. Arpeggios only work well in certain styles of music and finger exercises only alleviate the physical challenges presented by hand span.

In conclusion, one might ask what do the examples presented in this project say about the Western cultural values. If one interprets these examples from a reification standpoint it is easy to state that instruments only demonstrate the historical fact that the majority of professional

musicians were men. However, if one opens the case to exploration through Langdon Winner's theory of "technological politics" (values), it becomes clear that instruments are gendered, and therefore, certain instruments, such as the piano and the cello, encourage male performers and challenge and discourage the many of female players.

A conclusion based Winner's standpoint emphasizes the need for the production of musical technology as a means of fighting Western gender biases. Through this project, it has become clear that the gender biases embodied in musical instruments can only be changed through a combination of technological and social reform. Changes in music education and pedagogy could incorporate non-traditional and creative approaches to support female players in practice and performance. Creating new venues for female performances, compositions and recording, as well as listening to a variety of interpretations of pieces, including those on modified instruments, can help individuals become open to new sounds. Another approach to changing the gender biases within classical music would be to utilizing the mass media to feature the achievements, struggles and challenges of female players, instrument makers and composers. These suggestions for social change combined with new developments in musical technology could lead to a new set of musical artifacts; a set of artifacts that embody the values of a more egalitarian society, where male and female musicians are truly equal.

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