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The Influence of Sexism in Accounts of Fertilization

Epistemology, which generally refers to the study of knowledge, involves an examination of how beliefs are justified, the sources through which justification is established, and the limitations of knowledge (Epistemology). In her publication, *Gender and the Biological Sciences*, Kathleen Okruhlik gives an epistemological critique of the manner in which science perpetuates sexist accounts of fertilization. She rejects the notion that androcentrism can be filtered out of scientific theory by testing hypotheses against nature and basing their acceptance on objective evidence gathered. This essay will further evaluate how historical explanations and narrations of the egg and the sperm, as described by anthropologist Emily Martin, are illustrations of both the influence of social factors on science and tools with which harmful, sexist stereotypes have been reinforced. Building from this, I argue that impartial accounts cannot exist without a more balanced representation of women in the scientific community. Moreover, I argue that even were the best scientific practices of rationality and falsifiability to be followed and sociological factors to be sifted out through confirmatory testing, sexism would inevitably be reintroduced into scientific knowledge during the process of interpreting results.

In "The Egg and the Sperm: How Science has Constructed a Romance Based on Stereotypical Male-Female Roles," Emily Martin describes gender normative, metaphorical narratives of fertilization. Gametes are anthropomorphized in such accounts, with the sperm described as a masculine actor and the egg characterized as his passive female counterpart. While the sperm is an active agent who propels himself through the dark, perilous female reproductive system using a strong tail, the egg sits quietly, awaiting his arrival in the confinements of her home, the uterus. The egg is often depicted as a damsel in distress who will

perish if not penetrated by a heroic sperm. She is the conquering sperm's rightful prize after endeavoring to rescue her from being disposed of during menstruation. Even following a breakthrough at Johns Hopkins University which endowed eggs with a more active role in fertilization, the use of sexist stereotypes in the narration of fertilization persisted. No longer a damsel in distress, the egg was transformed into a femme fatale. She became a black widow, "designed to trap the sperm [in her sticky zona] and prevent their escape" (Martin 493). Regardless of the biochemical role that scientists grant the egg during fertilization, her story is narrated in relation to that of the masculine sperm and in terms of traditional gender norms. She is a damsel in distress, a bride, a femme fatale… And any modifications made to this metaphorical narrative in lieu of scientific developments are still made to fit the context of the conventional, gender normative relationship described. To grant the egg a journey independent from that of the sperm or an existence free from the constraints of sexist imagery which dominates human society and has been normalized in the schemata of scientists would require that a narrative specifically aiming to challenge this sexism be imagined from scratch.

Okruhlik utilizes a diagram of nodes to describe how methodological objectivists, those who believe that hypotheses should be repeatedly tested against nature in a manner which risks falsification to determine their validity and reliability, argue for the objectivity of science. She asserts that each node represents a juncture at which scientists must determine which from a number of competing hypotheses to incorporate into the body of prevailing knowledge. Methodological objectivists propose that this decision is made rationally, based only upon the comparative justification generated in support of each hypothesis by testing it against nature. The hypothesis which best withstands tests of falsifiability is the one which will be selected, and this

is how "sociological influences are effectively screened from affecting the content of science…" (Okruhlik 201). However, Okruhlik rejects the theory that rationality at the junction of decision making shields scientific knowledge from sociocultural norms, sexism in the case of fertilization. Rather, she argues that if theories "have all been generated by males operating in a deeply sexist culture, then it is likely that all will be contaminated by sexism. Non-sexist rivals will never be generated" (Okruhlik 201-202). She maintains that without the presence of non-sexist hypotheses in the pool of contenders, science is fated to remain entrenched in normative societal views.

Changing narratives of fertilization clearly illustrate a manifestation of Okruhlik's argument. Had the methodological objectivists been correct when asserting that rationality at the site of a juncture provides insulation from social influences, we would have seen a transition from hypothesizing the egg's role as an object relevant to fertilization only once the sperm reaches the uterus, to a hypothesis emphasizing the role of both gametes as equally active agents. Scientists would disseminate knowledge of the journey of the sperm *and* the egg as equally active partners rather than simply reshaping the prevailing account of the sperm's journey *to* the egg. Yet, as Okruhlik predicts, researchers devised an account in which the sperm retains masculine authority and the egg, although no longer passive, still fits within a sexist mold of what it means to be female, in this case, a femme fatale. Both accounts were shaped by persons operating within a society in which sexism is the prevailing force determining gender roles and relations. Thus, the content of both hypotheses is sexist. In addition to the influence of sexism in shaping theoretical explanations and metaphorical narratives of fertilization, these accounts serve to justify the "truth" of sexist stereotypes operating on a macro-level in society. Popular metaphorical narratives of scientific phenomena are frequently understood to be simplified

versions of factual scientific accounts, meaning the veracity of these narratives is rarely challenged. In this way, the use of sexist stereotypes in narrating the journey of the sperm to the egg naturalizes the passivity (or siren-esque nature) and the inferiority of women on a biological level. This biological confirmation of female inferiority serves to justify the wide acceptance of such stereotypes in society. Thus, scientific accounts of fertilization are both directly shaped by and responsible for perpetuating the harms of sexism.

Methodological objectivists might object to describing scientific knowledge as inevitably sexist by arguing that the theoretical descriptions and/or metaphorical narratives in which knowledge is framed are distinct from that knowledge itself. They may contend that such explanatory accounts do not reflect the objective, justificatory data obtained when testing hypotheses of fertilization against nature, nor is it the responsibility of scientists to ensure that descriptions and narratives of such knowledge are written objectively. The role of scientists in maintaining objectivity seems to begin and end with the natural testing of hypotheses which will "tell us which theory is preferable to its extant rivals on purely objective grounds" (Okruhlik 201). A second objection of theorists utilizing the methodological objectivist framework would be to argue that the reason few hypotheses proposing a greater role of the egg in fertilization exist is simply due to their falsification or a lack of justification generated when these theories are tested against nature. For instance, when a hypothesis investigating the active role of microvilli projecting from eggs was confirmed, it was incorporated into the knowledge base. I propose methodological objectivists would argue there is no reason to believe that this would not have been the case if other egg-centric hypotheses were well-supported at junctures of rational assessment and decision-making. That theories of fertilization and its reductionist components

ascribe centrality to the sperm is simply reflective of objective, naturally tested and confirmed truth according to philosophers of science and scientists practicing within this framework.

In refuting the notion that testing hypotheses against nature insulates science from sexism, it should first be noted that if methodological objectivism were accurate, sexist accounts of fertilization should not have been assimilated into scientific knowledge in the first place. If tests of falsifiability were enough to insulate science from sexism, accounts relegating the egg to a mere object of sperm conquest and invasion should have never been incorporated into popular scientific knowledge. Even putting aside the anthropomorphized, stereotypic narratives of the damsel in distress and femme fatale, sexism prevails in more fundamental theoretical descriptions of raw data. In describing contact made between the egg and the sperm during fertilization, Martin explicates how the action of the sperm is always described prior to that of the egg. It is the sperm which first makes contact with the sticky surface of the zona to initiate entry despite the equally active role of the egg's "microvilli that actively cluster around the sperm" and which are also the "driving force for engulfment" (Martin 498). Moreover, in describing an enzymatic interaction between the egg and sperm using a lock and key metaphor, scientist Paul Wasserman assigns the role of the key to the sperm and of the lock to the egg, manifesting yet another metaphor in which the egg is relegated to the role of waiting for the sperm to act upon her stagnant form. Such descriptions are subtly, yet persistently shaped by normative language. Moreover, Okruhlik highlights that to be free of sexism requires more than the absence of overtly sexist explanations of phenomena. It also requires the presence of investigation which attempts to deny sexism access to scientific inquiry at the level of theory generation. She explains that science is built upon the "questions we ask, which hypotheses we

investigate, and which data we decide to ignore as evidentially insignificant" (Okruhlik 194), and the lack of female representation in the scientific community both historically and in our contemporary society creates an androcentric imbalance in the emphasis given to male and female roles in fertilization. Until this balance is righted, a disproportionate amount of experimentation will be devoted to theories with sexist origins and consequences.

Lastly, I reject the methodological objectivist notion that pure, truthful knowledge can exist independent of cognitive interpretation, and thus, cognitive bias. Assuming a method of induction, the generation of knowledge is rooted in the quantitative measurement and qualitative observation of phenomena, including fertilization and the roles of gametes. Prior to theoretical description, these measurements and observations are an unorganized and often nonsensical jumble of distinct numerical values and/or observable events. It is only when scientists analyze, organize, and interpret such data that knowledge, an understanding of what such data *means*, emerges. However, unlike raw data which can be a product of objective experimentation, interpretation and meaning-making are products of the scientists who draw meaning from this data. Thus, theoretical explanation and knowledge are inherently entwined via interpretation and are subject to the cognitive biases of their creators (i.e., scientists). This becomes even more complex when considering the prevalence of metaphorical narratives laden with gender normative interpretation, as these narratives, like that of the egg and the sperm, which are so deeply ingrained in society (and by extension, scientists) also tend to infiltrate theoretical explanations of phenomena. In sum, theoretical interpretations and descriptions of fertilization are not pure, epistemic products of objective experimentation, but are laden with normative language and feed sexist stereotypes.

Works Cited

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