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Reordering Life: Knowledge and Control in the Genomics Revolution, by **Stephen Hilgartner**.
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Continuing developments in our technical abilities, such as the development of “gene editing” systems, continue to make human genetics the subject of much scholarly research. The Human Genome Project (HGP) produced the text that can now be edited, by sequencing and mapping “all” human genes – a project that began to be conceptualized in the 1980s and was “completed” in 2003. The scare quotes in the previous sentence represent just a few of the controversies that emerged during the life of the project, and Hilgartner’s new book provides an excellent account of the project’s sociological side.

The sociological research reported in the book was conducted from 1988 to 2003, and is based on ethnography, document analysis and 190 formal interviews. Operating with the “co-production” strand of the science studies theoretical tool kit, the science justifiably slides into the background and Hilgartner highlights all of the changes in social structures around the project. The HGP was largely a sociological, not biological, triumph.

The primary social structure that was co-produced throughout the life of the HGP was the “knowledge control regime,” which Hilgartner defines as “a sociotechnical arrangement that constitutes categories of agents, spaces, objects, and relationships among them in a manner that allocates entitlements and burdens pertaining to knowledge” (p.9). Some of the more well known sociotechnical arrangements concern ownership, authorship, collaboration and responsibility.

The book is organized as a loose chronology, which allows him to focus on how and why these knowledge control regimes changed. Focusing on the sociotechnical vanguard who have influence in this particular social world, he shows how interested agents navigate among the existing regimes. The author paraphrases Marx when he writes that the vanguard could not make the regimes “simply as they please,” but must rather use the “cultural resources and practices already given and transmitted from the past.” (P.230)

The first few substantive chapters therefore describe the knowledge control regime in place for biology at the onset of the HGP in the 1980s. To take a regime that would be under great pressure over time, the original vanguard thought that the knowledge the project produced would be freely accessible to the entire world-wide scientific community (p.38). Or, another: biology labs were independent entities with many incentives in place to not share data and materials. This too would have to fall under a new regime for the HGP to go forward.

The middle chapters of the book show the regime change. Chapter four documents two competing regimes for combining the different maps from the different laboratories. Not only did someone have to decide which lab would work on which part of the genome, but how would it be known if they were doing a good job? There were many types of maps in use – genetic linkage maps, restriction maps, radiation hybrid maps, contig maps – each of which offered their own view of the genome. The regime was later put in place where all participating labs had to report their data using a “sequence-tagged site.” A rival regime from Europe that was designed to facilitate communication between labs was not accepted by the Americans.

Similarly, there are all sorts of knowledge objects that labs could produce. For example, they could be sequencing and mapping “partial cDNA,” or an “expressed sequence tag.” Are pieces of DNA all that are needed, and is finding a piece the same as “discovering” “the” gene? Wrapped up in all of this is that some members of the vanguard began to advocate that these tags be patented, which would have instituted an entirely new regime. How the actual gene sequences are made publicly available, be it through publication in a paper journal or some other means, was also an ongoing struggle. This impacted other regimes such as the academic credit needed by the scientists in this world. One of the more interesting cases is the creation of a new type of knowledge with an unclear reward system for its producers: “unpublished in journals but available in databases.” This created additional tensions because, if the data from a large project is required to be put in a database, other teams can download it, write it up, and get credit for generating that knowledge.

An appendix details the author’s decisions during his ethnographic and interview data gathering. It is quite useful for graduate students as well as established researchers to see the various moment by moment ethical and epistemic decisions that inevitably had to be made. The book also contains a number of drawings that illustrate the various scientific concepts such as cloning DNA using recombinant DNA technology, which facilitates the reader’s understanding.

This book uses its theoretical framework to give a detailed explanation of the social processes surrounding the HGP. It would have been useful for the author to have informally connected the transformations in knowledge control regimes to present day biological research. Did the regime changes in the HGP have an impact on biology or science more broadly going forward? For example, did those conflicts that led to certain data sharing protocols lead to the way data sharing is done now? I would also be curious to have Hilgartner or other scholars see whether similar regimes are found in current big science projects, like regenerative medicine. This is not a critique of what Hilgartner has done, but an expression of desire for more. I will stop putting work on others’ plates and end by saying that this is an excellent account of the knowledge processes surrounding the HGP and it will be the definitive account going forward.