

Transporting Knowledge: A Case Study of Meaning Making on the Pathways of Science Communication

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Abstract: In this paper I study scientists, reporters, and news readers as they produce and/or interpret scientific texts. Imagining all of these actors as *science learners* allows me to compare across their individual understandings to follow ideas through the pathways of science communication. I provide a case study of how one scientist's understandings causes difficulties for a reporter and two news readers. This case problematizes popular assumptions about the causes of public misunderstandings of science.

Popular science texts and readers

In this paper, I address a topic usually considered the realm of research in science communication—how science knowledge moves from scientist to the public—using tools and methods more common in the learning sciences, in order to construct a model of how the various actors and texts shape each other's understanding of science in the moment. In particular, I present findings from a study that used video-based observation, semi-structured clinical interviews, think aloud protocols, and textual analysis of scientists, university news staff, and members of the general public as they interacted—in person and through various texts—in an attempt to make sense of new scientific research in order to produce or consume popular science news articles. Scientific knowledge changes as it flows through the pathways of science communication mediated by these various actors (Cloître & Shinn, 1985) and socially-constructed texts (Bazerman, 1983). So, how do various actors interact with one another and with texts in order to make sense of and construct knowledge about scientific research?

Data collection and analysis

To begin addressing the research question I recruited twenty adult participants (aged 24–67) from a large US city, four scientists from a large university, and three university news reporters around three pieces of recently published scientific research. Each news reporter was interviewed about his or her assigned research both before and after writing their story. Additionally, I recorded their interactions with the scientist and collected copies of all texts, including article drafts and email exchanges. At the same time, I interviewed the scientists about their research. Next, the twenty adult participants were asked to think aloud as they read one of the news stories about the focal pieces of research. Finally, the participants were interviewed about their interpretation and understanding of the article's content. From this data, I present a case study constructed from content logs, transcripts, and thick descriptions of the observations and interviews, and content analysis of relevant texts. In order to analyze the in-the-moment sense making of each actor, I adopt the dual lenses of *knowledge analysis* (e.g. diSessa & Sherin, 1998)—which catalogs the resources of knowledge used moment by moment with the assumption that they are being drawn on from a complex mental ecology of resources based on contextual factors—and *interaction analysis* (Jordan & Henderson, 1995)—which describes interactions that shape thought and behavior.

A case study of an idea moving along a pathway of science communication

The research central to this case study is a biomedical study which—using data from a veterans' hospital—conclude that prescriptions of protein pump inhibitors (PPIs) are overprescribed to veterans at higher doses and for longer than recommended by experts. This is, of course, a very simplified description of the research, but it is enough to highlight how the various actors make sense of its meaning.

During my interview with Shannon—a writer and editor for the university's news service—I ask her to describe the research she gave me a general overview and then began explain her particular interpretations of the research. At one point, she said the following: “*This is in the veteran population and I think the point of that is this is, like, taxpayer money and we need to kind of know what's going on.*” The detail that the population of the study was veterans became a very important and hard to interpret idea. Here, Shannon latches onto this idea the veterans' healthcare is paid by taxes, and, thus, the over prescription of PPIs would result in wasteful tax spending. Later, when Shannon is interviewing Jacob—a research fellow at the university's medical school and co-author of the focal research—they have a conversation about the research. During their discussion they both casually mention the study being about veterans, but neither make an attempt to explain *why* the study is about veterans. Jacob does not provide any warrants or justifications for this detail. He does, however, frequently mention that PPIs are the most common prescription drug in the U.S “*in terms of number of prescriptions and the amount of money.*” When Jacob mentions money, Shannon sees her opportunity to bring up her idea about the importance

of the veteran population being supported by taxpayers: “*U.S. tax dollars too, right?*” Jacob does not seem to know how to react to this suggestion, as this was not a part of his research. He responds with mild confusion, and Shannon drops the idea of using the taxpayers as an angle and it does not appear in her finished story. However, Jacob does not recognize that the reason Shannon is able to make such an inference is that he fails to make clear why he chose veterans as his study population. Shannon is confronted with an unexplained detail (veteran population) and a framing of cost, and so she reasonably tries to reconcile these details to make sense of the research, using what she knows about this population and healthcare costs. Her framing of taxpayer money is much the result of Jacob’s underdetermined explanations. Shannon’s final text appears much like Jacob’s description—she mentions the population of veterans, but does not provide explanations, instead focusing on the popularity of PPIs. So, how do her readers make sense of this text?

During my observations and interviews with members of the general public, the idea that the population in the study was veterans became problematic. Steven, a 24-year-old high school graduate, noticed this fact almost immediately while reading the story. After reading the title, headline, and first paragraph, Steven thinks aloud, “*Oh, veterans in particular, huh?*” Here, Steven is trying to make sense of veterans being the chosen population of study. This statement shows that he is inferring that the population was chosen for a reason, but he cannot determine this reason. Later, during my interview with Steven, I asked him what the least important aspect of the study was and he mentions the “*emphasis placed on these patients being veterans.*” Steven never finds a reason for the emphasis to be placed on veterans, so he struggles to make sense of the research. He suggests a possible journalistic angle that the story is trying to garner sympathy for an at-risk population, but he ends up rejecting that inference, and simply deciding that the choice of population does not make sense and so is not important. A similar reaction can be seen with Alyssa, a 32-year-old college graduate. While reading the lead paragraph, Alyssa says, “*I’m thinking about my dad, because he used to get heartburn pretty regularly.*” Here, Alyssa is drawing on a personal experience to make sense of the research. Later, during the interview Alyssa incorrectly states that the researchers were the one’s giving the drugs to the veterans. When asked why she chose veterans she concluded, “*A lot of veterans experience heartburn.*” While, Alyssa obviously struggles to make sense of the research, I argue that at least part of the problem is the lack of specificity in the description of the study design choices. This lack of specificity allows Alyssa to make inferences about the study based on personal experience: drawing a connection between her father’s heartburn and the heartburn of the veterans. What explains this lack of explanation about such a seemingly important detail?

During my interview with Jacob, I asked him the most important part of his research for the public to understand. He replied: “*For me the most important part is that it gives insight into how these prescriptions are initially prescribed and continued over time.*” Not only does Jacob not mention the veteran population here, he hardly mentions them directly during the whole interview. They simply are not an important part of the study for him. Actually, more than that, when I ask him about weaknesses of his study, Jacob replied: “*It was done at a V.A. which can be a disadvantage.*” So, not only does Jacob not highlight the focal population, he actively believes it to be a weakness of the study. What is going on here? Jacob’s interest in the study is the over prescription of drugs, and the veterans are a convenient sample based on the funding (Veteran’s Affairs). Of course, tradeoffs like this are common in the social work of science, and must be communicated in the science literature. However, when this detail goes beyond the rhetoric of science, Jacob does not provide any explanation for his sampling of veterans. This places the responsibility of justifying this detail and evaluating the validity of claims solely on the audience. It is then not surprising that the news reporter and both members of the general public assert their own inferences about the detail. Without seeing Jacob’s role in creating a space for these inferences, it would be easy to dismiss other actors’ sense making as unreasonable, but seeing the interaction of all actors allows us to see how the system of science communication is actually an interconnected web of science learners who directly influence each other’s interpretation of scientific research. This is obviously an imperfect first step in understanding the impact of individuals on one another on the pathway of science communication. However, continuing work will allow us to piece together a grander picture of how people learn from popular science texts throughout their lives.

References

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