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How metaphors about the genome constrain CRISPR metaphors: separating the “text” from its “editor”

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Introduction

O’Keefe and colleagues present a thought-provoking analysis of metaphors used to discuss CRISPR in lay media, arguing that those currently in circulation fall short of accurately representing the science and fully conveying the ethical complexities of this emerging biotechnology (O’Keefe et al. 2015). Indeed their analysis demonstrates the challenges of sifting through the “muddle” of metaphors that come with new technologies or scientific concepts (Stelmach and Nerlich 2015; Keller 2010). We applaud the authors’ goal to ultimately contribute to an informed public that can more fully and competently engage in policy debates about CRISPR, and we present our critique in the spirit of furthering that goal.

Here we offer two primary ways in which to develop a clearer and more accurate account of the complexity of the metaphors they examined. First, metaphors for CRISPR will naturally be shaped and constrained by dominant metaphors about the genome, as the substrate of CRISPR. However, the authors fail to sufficiently distinguish the two subjects, or “tenors,” of genome and CRISPR in the metaphors they identify. Rather than conflating the two sets of metaphorical concepts, we suggest disentangling them to allow for a more careful analysis of the implications they carry. Second, we identify a need to distinguish between metaphors for what CRISPR *is*, as a technology, versus what CRISPR *does*, in applications. Examining the CRISPR metaphors more carefully along these two dimensions will help fulfill the authors’ goal of finding CRISPR metaphors that help inform and engage the public to make meaningful contributions to forthcoming policy deliberations.

Metaphorical concepts

Metaphor analysis involves identifying metaphorical language and then articulating the underlying metaphorical concepts (Schmitt 2005). For example, phrases such as “the genome is read” and the “first draft of the human genome” can be grouped into the underlying metaphorical concept “the genome is text.” The latter can be articulated as “tenor is vehicle” (Richards 1936), where the vehicle is the more familiar idea or object (e.g., text) being used to describe the less familiar tenor (e.g., genome). O’Keefe and colleagues appear to have done the first half of the metaphor analysis — identifying the metaphorical language in the lay media articles they examined; however, they stopped short of the final key step, stating the underlying metaphorical concepts. The failure to articulate metaphorical concepts in their analysis leads to confusion between different tenors (genome and CRISPR) and a missed opportunity to understand what the identified metaphors say about what CRISPR *is* versus what it *does* and *by whom*.

A case of two tenors: genome and CRISPR

In their analysis of lay media articles about CRISPR, the authors identify linguistic expressions referring both to the genome and to CRISPR. Granted, they set out to identify metaphors “associated with CRISPR,” which necessarily draws in metaphors about the genome as CRISPR’s substrate. Yet by not resolving the text excerpts into metaphorical concepts, they do not sufficiently distinguish between these two tenors. In Table 1, three of the eight metaphors presented are predominant metaphors about the genome: “blueprint/construction,” “code,” and “map” (Condit 1999). Only one metaphor in this table can be stated unequivocally as a metaphorical concept with CRISPR as the tenor: “CRISPR is a molecular scalpel.” The presented analysis switches back and forth between CRISPR and the genome as tenors, and this implicit switching misses the opportunity to make explicit how the genome metaphors are potentially shaping and constraining the CRISPR metaphors.

Metaphors about CRISPR: what it *is* versus what it *does* and *who* does it

What O’Keefe et al. label as “dominant metaphors used for CRISPR,” “editing” and “targeting,” are again not articulated as metaphorical concepts, making it difficult to understand the implications of these metaphors. First, both “editing” and “targeting” are verbs, and thus describe what CRISPR *does* rather than what it *is*. What is the vehicle in the metaphorical concept “CRISPR is X”? To describe what CRISPR *is* through a metaphorical concept, the vehicles would have to be the technologies that allow one to edit and to target, such as a word processor (used for editing) and high-tech weaponry (used for targeting). Both technologies are used by people, so both vehicles emphasize the agency of scientists. By identifying the vehicles of the metaphorical concepts, we have revealed an implied locus of control in passages that describe CRISPR as being used to “edit” and “target,” a previously obscured aspect of these metaphors.

The authors conclude that the “editing” metaphors are overly positive towards CRISPR while the “targeting” metaphors potentially capture the danger of negative and unintended consequences. However, we argue that the locus of control, revealed by identifying the underlying metaphorical concepts, may influence whether the tenor (CRISPR) is viewed positively or negatively. Editing may seem positive or beneficial to an editor but negative or harmful to the one being edited, especially if the person doing the editing is not fully trusted by the person being edited. Similarly, targeting may seem perilous to the one being targeted or hit as collateral damage, but wholly positive to the one holding the weapon in a posture of defense against dangerous and powerful forces.

O’Keefe et al. deem the metaphors they found, whether about the genome or about CRISPR, inadequate to convey the complexity and uncertainties of CRISPR. They suggest ecological metaphors as a potential remedy; however, once again the tenor of this metaphor is the genome and not CRISPR. If the genome in its environment is an ecological system, then the metaphorical concept for CRISPR would presumably be some sort of technology for disrupting the ecosystem. The fact that the term for such a technology is not close at hand suggests the “muddle” in which we find ourselves as we try to describe a new technology with a metaphorical vehicle that is similarly unfamiliar. Without determining which

vehicle(s) are attached to CRISPR within this larger metaphorical concept of “the genome is an ecosystem,” it seems premature to say that this framework would be any better or worse than the metaphors already in circulation.

Conclusions

We agree with O’Keefe and colleagues that metaphors are unavoidable, and like them, we do not advocate a “metaphor-free zone.” Indeed, metaphors play an important role in shaping the conceptual models of both the public and the scientific community. Metaphors may help explain the molecular mechanisms of CRISPR and also the contexts in which CRISPR can be applied. One downside of metaphors is that they act as selective filters, highlighting some aspects of the tenor while obscuring others (Black 1954). Thus while metaphors can help to further the public’s understanding of CRISPR, metaphors can also undermine, mislead, and misrepresent. In order to develop effective and accurate metaphorical concepts for CRISPR, we need to study metaphors for CRISPR itself. It is true that we also need to pay attention to the predominant metaphors about the genome. The analysis by O’Keefe *et al.* demonstrates that metaphors about the genome extend into discussions of CRISPR. Indeed, the CRISPR metaphors that resonate with people are likely to be the ones that are consistent with, if not directly building off, prevailing metaphors about the genome (e.g., book of life, computer code, map, and blueprint). However, to fully understand the implications of these metaphors we must accurately recognize which tenors attach to which vehicles and this can only be done by carefully identifying the underlying metaphorical concepts.

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