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► **To cite this version:**

Olivier Putois, François Villa, Jonathan Weitzman. Lost in post-translation. EMBO Reports, 2015, Embo Reports, Volume 16 (Issue 6), pp.671. <10.15252/embr.201439980>. <hal-01494538>

**HAL Id: hal-01494538**

**<https://hal.science/hal-01494538v1>**

Submitted on 24 Mar 2017

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# Lost in post-translation

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Shakespeare suggested that names are of little importance and that “A rose, by any other name would smell as sweet” [1], but we beg to differ. The names that we choose to describe processes and concepts—biological or otherwise—profoundly influence the way we think about them. This is brought home when interdisciplinary research gathers together colleagues from diverse fields who struggle to understand what familiar words mean in new intellectual contexts. As biological research becomes increasingly interdisciplinary, the use of “shared but different” technical terms becomes increasingly fraught. For example, biologists share many terms with computer scientists that describe both biological and digital phenomena, and communication becomes even more demanding when interacting with colleagues from the social sciences, for whom words can have completely different meanings. The difficulties are heightened with those terms that biologists have outright appropriated from other disciplines—albeit with good reason—but in doing so have stripped away their original nuance and meaning.

It is thus timely to step back and reflect on the names we use to describe various aspects of biology, not only because they can make it harder to work with colleagues for whom the paradigm of a word is entirely different, but also because our lexicon appears stuck in the past. The last few decades have seen major shifts in the ways we think about gene regulation, but words laden with the preoccupations of a previous paradigm could hinder the development of the emerging one.

An example of such “lexical inadequacy” that strikes us as particularly illustrative is biologists’ use of the words “translation” and “post-translational”. The former is used to refer to the conversion of RNA sequence information into the order of amino acids in protein products, while the latter refers to the chemical marking of proteins after their synthesis. But when we step back and

compare this choice of word with the actual practice of the linguistic translator, we cannot but acknowledge the gap. A striking point is that linguistic translation, despite the use of clear rules, cannot prescribe a unique translated outcome. The translator must choose the right translation among the multiple equivalents of a word or expression available in the target language, depending on the contextual elements of both texts. The negotiation from one language to another is the art of the translator, requiring skill and experience.

Biologists have robbed this powerful metaphor of much of its richness. We think of protein translation not as contextual negotiation, but rather as a boring process of decoding; translation becomes a linear conversion with only one predictable, unambiguous outcome. The inadequacy of the way we use the metaphor is perhaps best highlighted by the necessity to invent, sometime after the genetic code was cracked, the word “post-translational”, which adds back meaning and context. Indeed, getting from genotype to phenotype is not a linear conversion; it is more a process of negotiation, of trial and error, which takes into account temporal context. The outcome of biological translation, it turns out, also requires the fine-tuning required in linguistic translation.

Translation is not our only sin in this regard, of course. We have similarly hitched other shared words and ideas to our scientific cart, including transcription, sequence (which we use as both noun and verb), and both code and network (which are particularly troublesome during our collaborations with computer scientists), among others. We are not at fault for all of their dual meanings, as their use in each discipline has often been coincident. But for each one, it is timely to ask whether they are still the right words for the concepts we are trying to capture, or whether it is time to retire their

service in the scientific lexicon. If we decide for the latter, the question is how do we proceed? How can we reform our language to embrace the original richness of the words we use, or how do we agree on alternatives, to inform our thinking about the scientific concepts they now represent?

Just as evolution involves constant changes in the ways that sequences of “letters” are used to adapt to new challenges, we favor adaptation rather than extinction. Increasingly frequent encounters with colleagues from other disciplines—from computer sciences to the humanities and beyond—force us to redefine what we mean by the terms we use. Some words, like the paradigms they accompany, will fall by the wayside, while others will continue to adapt and change. But perhaps increased awareness of their evolutionary history will return the richness to the metaphors and encourage us to think more about the complexity of the concepts behind the simple names we have chosen.

When reflecting on his choice of title for his famous first-novel, *The Name of the Rose*, Umberto Eco confided that, “I liked it because the rose is a symbolic figure so rich in meaning that by now it hardly has any meaning left” [2]. Perhaps a post-translation William Shakespeare would agree with us that the names we choose are important after all.

## Acknowledgements

Our work is supported by the “Who Am I?” Laboratory of Excellence #ANR-11-LABX-0071 funded by the French Government through its “Investments for the Future” program operated by the ANR under grant #ANR-11-IDEX-0005-01.

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DOI 10.15252/embr.201439980