Transparency in Film

Increasing Credibility of Scientific Animation Using Citation

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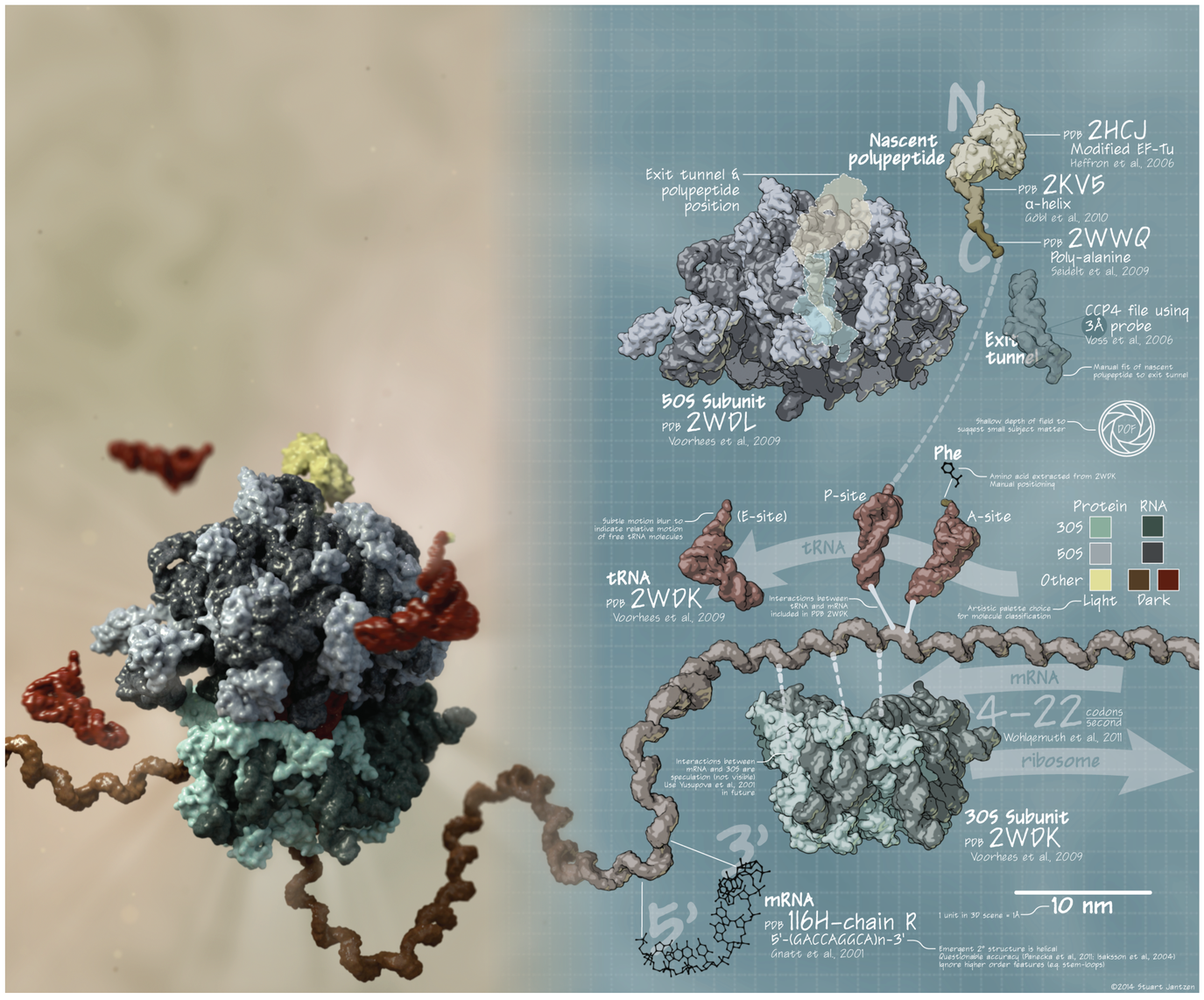

Figure 1 The design of a scientific illustration or animation (left) is multifaceted and there are many decisions to be made. Here we visually demonstrate some of the data sources, information processing, and artistic considerations (right) that result in the depiction of a 70S Ribosome. This image was submitted for the cover of Nature Methods (Nature: left, Methods: right).

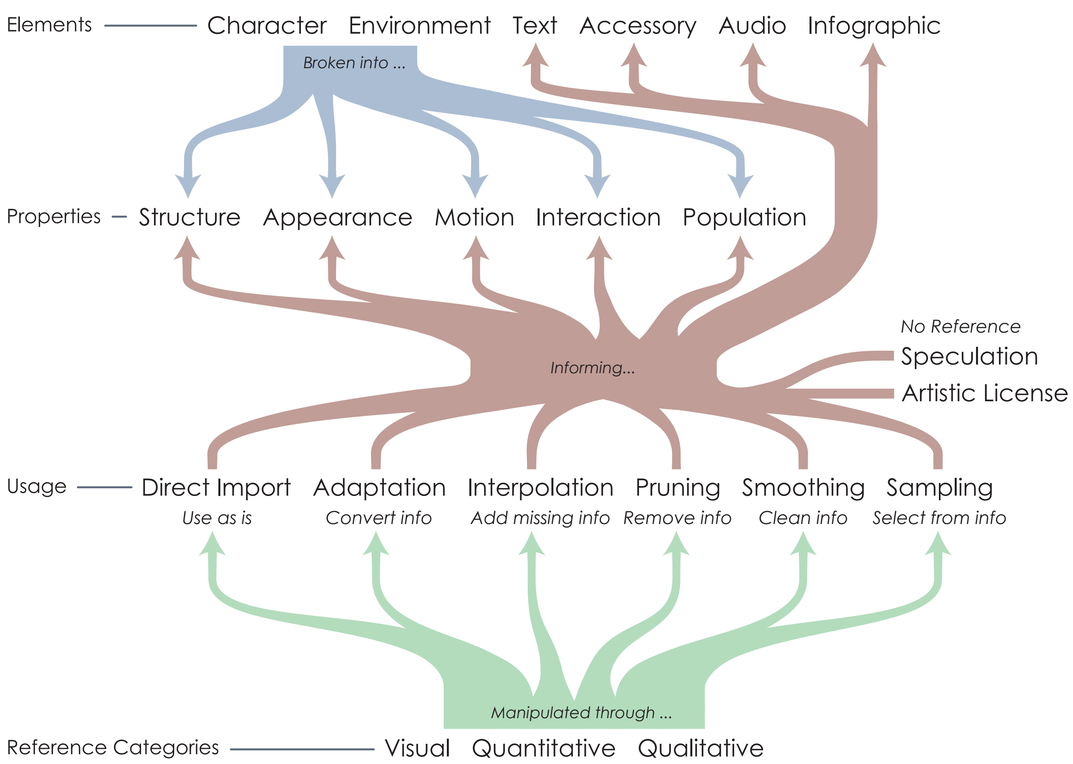

Figure 2 Data sources may be linked to specific components of an animation. This flow chart outlines categories and terms in a citation hierarchy and their relationships to each other. These include elements, properties, reference types, and usage.

Funding & References

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Figure 3 Elements in a shot from a scientific animation. Adapted from "Recording the Illuminated Neuron" vimeo.com/70039214 © Stuart Jantzen 2013

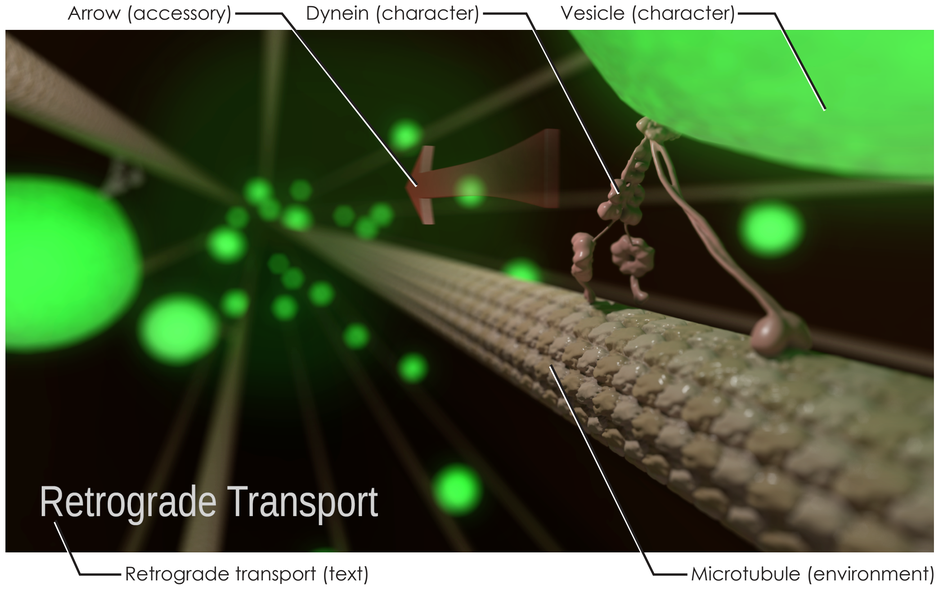
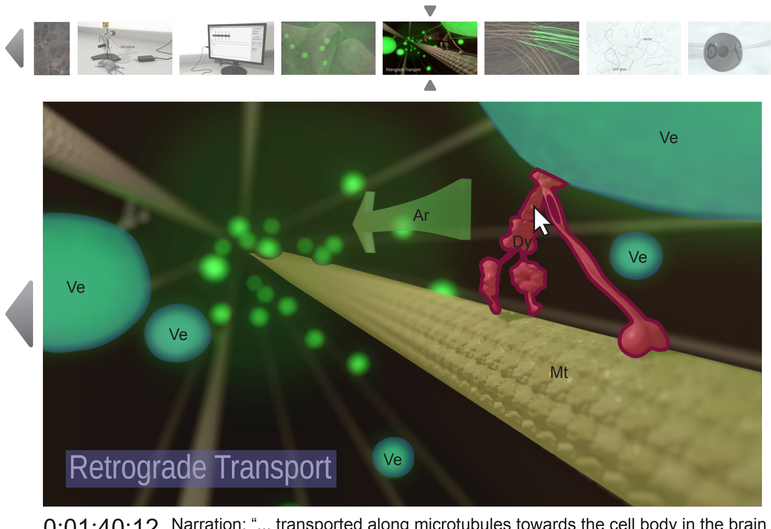


Figure 4 Example output format for annotated citations used in a scientific animation. This interactive module allows users to navigate through a filmstrip of thumbnails, then click on various elements and see the list of references behind the design of that element.



0:01:40;12 Narration: "... transported along microtubules towards the cell body in the brain in a retrograde fashion."
Sound Effects: None

Character: Dynein
Structure:
37) RCSB PDB - 3VKH. [Internet]. 2012 [cited 2014 Feb 12]. Available from: http://rcsb.org/pdb/explore/explore.do?structureId=3VKH
Quantitative. Adaptation, Interpolation, Smoothing: Partial crystallographic structure imported as indirect reference
38) Vale, R. D. The molecular motor toolbox for intracellular transport. *Cell* **112,** 467–480 (2003).
Visual. Interpolation: Illustration of molecular structure (Figure 1)
Appearance:
Artistic license: Color and surface properties for aesthetic reasons.
Motion:
39) Iwasa, J. Molecular motor struts like drunken sailor. [Internet]. 2012 [cited 2014 Feb 12]. Available from: http://www.youtube.com/watch?v=-7AQVbrmzFw.
Visual. Sampling: Walk cycle informed by empirical animation
40) Qiu, W. *et al.* Dynein achieves processive motion using both stochastic and coordinated stepping. *Nat. Struct. Mol. Biol.* **19,** 193–200 (2012).
Qualitative. Sampling: Ref (39) is based on this article
Interaction:
41) Alberts, B. *et al. Molecular Biology of the Cell* 4th edn 959 (Garland Science, 2002).
Visual. Interpolation: Schematic of dynein complex bound to microtubule and vesicle